



11

Sampling Outcomes

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

Table 11.1 shows the quality indicators for population coverage and the various pieces of information used to derive 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 had unexpected values. Many references are made in this chapter to the various sampling tasks on which 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 $P/(P+E) \times (ST7b_3/ST7b_1)$:

- The national population (NP) 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 NP 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 2006, the procedure for PISA 2009 was that very 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 excludes 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 NP 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 NP covered by the non-excluded portion of the student sample.

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

- 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 NP, 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 shows the extent to which the weighted participants covered the final target population after all school exclusions.

Coverage Index 2 shows the extent to which the weighted participants covered the target population of all enrolled students in grades 7 and above.

Coverage Index 1 and Coverage Index 2 will differ when countries have excluded geographical areas or language groups apart from other school level exclusions.

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.

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. 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.

Tables 11.2, 11.3 and 11.4 present school and student-level response rates:

- Table 11.2 indicates the rates calculated by using only original schools and no replacement schools.
- Table 11.3 indicates the improved response rates when first and second replacement schools were accounted for in the rates.
- Table 11.4 indicates the student response rates among the full set of participating schools.

[Part 1/4]
Table 11.1 Sampling and coverage rates

	All 15-yr olds	Enrolled 15-yr olds	Target population	School-level exclusions	Target minus school level exclusions	% school level exclusions	Est. of enrolled students from frame	Number participating students	Weighted number of participating students
OECD									
Australia	286 334	269 669	269 669	7 057	262 612	2.62	271 695.64	14 251	240 851.46
Austria	99 818	94 192	94 192	115	94 077	0.12	94 260.56	6 590	87 326.21
Belgium	126 377	126 335	126 335	2 474	123 861	1.96	126 851.21	8 501	119 140.46
Belgium (Flemish Community)	70 492	68 508	68 508	1 482	67 026	2.16	70 722.91	4 596	65 847.61
Canada	430 791	426 590	422 052	2 370	419 682	0.56	411 343.27	23 207	360 286.41
Chile	290 056	265 542	265 463	2 594	262 869	0.98	260 330.55	5 669	247 269.72
Czech Republic	122 027	116 153	116 153	1 619	114 534	1.39	113 960.78	6 064	113 951.07
Denmark	70 522	68 897	68 897	3 082	65 815	4.47	65 967.28	5 924	60 854.5
Estonia	14 248	14 106	14 106	436	13 670	3.09	13 230.16	4 727	12 977.98
Finland	66 198	66 198	66 198	1 507	64 691	2.28	63 751.48	5 810	61 463.00
France	749 808	732 825	720 187	18 841	701 346	2.62	699 775.90	4 298	677 620.22
Germany	852 044	852 044	852 044	7 138	844 906	0.84	838 259.48	4 979	766 992.57
Greece	102 229	105 664	105 664	696	104 968	0.66	100 528.92	4 969	93 088.22
Hungary	121 155	118 387	118 387	3 322	115 065	2.81	103 378.07	4 605	105 610.83
Iceland	4 738	4 738	4 738	20	4 718	0.42	4 558.00	3 646	4 409.87
Ireland	56 635	55 464	55 446	276	55 170	0.50	55 997.41	3 937	52 794.26
Israel	122 701	112 254	112 254	1 570	110 684	1.40	112 068.76	5 761	103 184.06
Italy	586 904	573 542	573 542	2 694	570 848	0.47	564 811.20	30 905	506 732.90
Japan	1 211 642	1 189 263	1 189 263	22 955	1 166 308	1.93	1 138 693.53	6 088	1 113 402.69
Korea	717 164	700 226	700 226	2 927	697 299	0.42	683 793.03	4 989	630 030.35
Luxembourg	5 864	5 623	5 623	186	5 437	3.31	5 437.00	4 622	5 124.00
Mexico	2 151 771	1 425 397	1 425 397	5 825	1 419 572	0.41	1 399 638.41	38 250	1 305 460.77
Netherlands	199 000	198 334	198 334	6 179	192 155	3.12	192 139.64	4 760	183 546.23
New Zealand	63 460	60 083	60 083	645	59 438	1.07	59 344.11	4 643	55 128.80
Norway	63 352	62 948	62 948	1 400	61 548	2.22	61 919.76	4 660	57 366.74
Poland	482 500	473 700	473 700	7 650	466 050	1.61	464 534.79	4 917	448 866.15
Portugal	115 669	107 583	107 583	0	107 583	0.00	109 204.60	6 298	96 820.39
Slovak Republic	72 826	72 454	72 454	1 803	70 651	2.49	72 092.30	4 555	69 274.05
Slovenia	20 314	19 571	19 571	174	19 397	0.89	20 126.72	6 155	18 773.01
Spain	433 224	425 336	425 336	3 133	422 203	0.74	424 705.47	25 887	387 054.48
Spain (Andalusia)	91 798	90 094	90 094	291	89 803	0.32	90 195.46	1 416	80 895.37
Spain (Aragon)	10 957	11 413	11 413	61	11 352	0.53	11 792.97	1 514	10 644.27
Spain (Asturias)	7 704	7 540	7 540	45	7 495	0.60	7 544.12	1 536	7 064.66
Spain (Balearic Islands)	10 356	9 632	9 632	36	9 596	0.37	9 743.05	1 463	8 861.19
Spain (Basque Country)	16 414	16 461	16 461	42	16 419	0.26	16 390.44	4 768	15 470.74
Spain (Canary Islands)	21 514	20 384	20 384	27	20 357	0.13	20 116.78	1 448	17 685.75
Spain (Cantabria)	4 724	4 625	4 625	25	4 600	0.54	4 575.13	1 516	4 321.04
Spain (Castile and Leon)	21 133	21 333	21 333	86	21 247	0.40	20 228.07	1 515	18 757.58
Spain (Catalonia)	63 570	63 494	63 494	611	62 883	0.96	62 360.90	1 381	56 126.92
Spain (Ceuta and Melilla)	1 857	2 129	2 129	6	2 123	0.28	2 123.00	1 370	1 643.46
Spain (Galicia)	23 283	22 815	22 815	72	22 743	0.32	23 157.71	1 585	21 661.55
Spain (La Rioja)	2 701	2 801	2 801	12	2 789	0.43	2 775.00	1 288	2 455.92
Spain (Madrid)	56 875	54 986	54 986	297	54 689	0.54	54 405.87	1 453	51 696.45
Spain (Murcia)	15 257	15 591	15 591	61	15 530	0.39	15 394.36	1 321	12 922.74
Spain (Navarra)	5 277	5 719	5 719	25	5 694	0.44	5 569.80	1 504	4 849.04
Sweden	121 486	121 216	121 216	2 323	118 893	1.92	120 801.61	4 567	113 053.84
Switzerland	90 623	89 423	89 423	1 747	87 676	1.95	85 951.73	11 812	80 839.05
Turkey	1 336 842	859 172	859 172	8 569	850 603	1.00	849 830.25	4 996	757 297.66
United Kingdom	786 626	786 825	786 825	17 593	769 232	2.24	736 340.73	12 179	683 380.04
United Kingdom (Scotland)	63 826	64 729	64 729	1 095	63 634	1.69	63 083.03	2 631	54 884.90
United States	4 103 738	4 210 475	4 210 475	15 199	4 195 276	0.36	3 941 908.48	5 233	3 373 264.35



[Part 2/4]
Table 11.1 Sampling and coverage rates

	Total number excluded students	Total weighted number of excluded students	Total number ineligible students	Total weighted number of ineligible students	Within school exclusion rate (%)	Overall exclusion rate (%)	Percentage ineligible / withdrawn	Coverage Index				
								1	2	3	4	5
OECD												
Australia	313	4 388.60	747	9 371.67	1.79	4.36	3.82	0.96	0.96	0.84	0.90	1.03
Austria	45	606.63	175	2 237.65	0.69	0.81	2.54	0.99	0.99	0.87	0.93	1.00
Belgium	30	291.51	196	2 307.72	0.24	2.20	1.93	0.98	0.98	0.94	0.94	1.02
Belgium (Flemish Community)	13	176.06	65	884.33	0.27	2.42	1.34	0.98	0.98	0.93	0.93	1.06
Canada	1 607	20 836.72	1 524	18 161.76	5.47	6.00	4.77	0.94	0.93	0.84	0.93	0.98
Chile	15	619.64	259	10 297.52	0.25	1.22	4.15	0.99	0.99	0.85	0.95	0.99
Czech Republic	24	422.76	59	935.25	0.37	1.76	0.82	0.98	0.98	0.93	1.00	0.99
Denmark	296	2 447.91	105	779.43	3.87	8.17	1.23	0.92	0.92	0.86	0.96	1.00
Estonia	32	97.17	11	31.49	0.74	3.81	0.24	0.96	0.96	0.91	0.99	0.97
Finland	77	716.62	29	300.24	1.15	3.40	0.48	0.97	0.97	0.93	0.98	0.99
France	1	303.95	6	996.73	0.04	2.66	0.15	0.97	0.96	0.90	0.97	1.00
Germany	28	3 590.95	56	8 357.46	0.47	1.30	1.08	0.99	0.99	0.90	0.92	0.99
Greece	142	2 976.54	103	2 153.55	3.10	3.74	2.24	0.96	0.96	0.91	0.96	0.96
Hungary	10	361.44	60	1 348.80	0.34	3.14	1.27	0.97	0.97	0.87	1.03	0.90
Iceland	187	188.53	20	20.25	4.10	4.50	0.44	0.95	0.95	0.93	1.01	0.97
Ireland	136	1 491.93	90	952.20	2.75	3.23	1.75	0.97	0.97	0.93	0.97	1.01
Israel	86	1 358.60	94	1 620.52	1.30	2.68	1.55	0.97	0.97	0.84	0.93	1.01
Italy	561	10 662.77	969	18 641.60	2.06	2.52	3.60	0.97	0.97	0.86	0.92	0.99
Japan	0	0.00	19	3 168.26	0.00	1.93	0.28	0.98	0.98	0.92	0.98	0.98
Korea	16	1 747.61	50	6 660.96	0.28	0.69	1.05	0.99	0.99	0.88	0.92	0.98
Luxembourg	196	270.00	20	24.00	5.01	8.15	0.44	0.92	0.92	0.87	0.99	1.00
Mexico	52	1 951.10	4 263	137 484.27	0.15	0.56	10.52	0.99	0.99	0.61	0.93	0.99
Netherlands	19	648.34	64	3 964.08	0.35	3.46	2.15	0.97	0.97	0.92	0.96	1.00
New Zealand	184	1 793.47	166	1 670.34	3.15	4.19	2.93	0.96	0.96	0.87	0.96	1.00
Norway	207	2 260.27	49	553.12	3.79	5.93	0.93	0.94	0.94	0.91	0.96	1.01
Poland	15	1 230.26	19	1 491.86	0.27	1.88	0.33	0.98	0.98	0.93	0.97	1.00
Portugal	115	1 543.54	259	3 644.56	1.57	1.57	3.71	0.98	0.98	0.84	0.90	1.02
Slovak Republic	106	1 515.69	65	903.11	2.14	4.58	1.28	0.95	0.95	0.95	0.98	1.02
Slovenia	43	137.83	55	125.66	0.73	1.61	0.66	0.98	0.98	0.92	0.94	1.04
Spain	775	12 672.70	970	15 067.22	3.17	3.88	3.77	0.96	0.96	0.89	0.94	1.01
Spain (Andalusia)	46	2 343.91	97	5 006.13	2.82	3.13	6.01	0.97	0.97	0.88	0.92	1.00
Spain (Aragon)	54	331.51	22	143.90	3.02	3.54	1.31	0.96	0.96	0.97	0.93	1.04
Spain (Asturias)	7	28.68	61	256.43	0.40	1.00	3.62	0.99	0.99	0.92	0.94	1.01
Spain (Balearic Islands)	24	128.07	51	254.58	1.42	1.79	2.83	0.98	0.98	0.86	0.92	1.02
Spain (Basque Country)	123	393.28	98	318.78	2.48	2.73	2.01	0.97	0.97	0.94	0.97	1.00
Spain (Canary Islands)	15	182.24	61	653.46	1.02	1.15	3.66	0.99	0.99	0.82	0.89	0.99
Spain (Cantabria)	49	132.94	14	38.57	2.98	3.51	0.87	0.96	0.96	0.91	0.97	0.99
Spain (Castile and Leon)	39	455.16	24	288.70	2.37	2.76	1.50	0.97	0.97	0.89	0.95	0.95
Spain (Catalonia)	85	2 964.41	21	786.70	5.02	5.93	1.33	0.94	0.94	0.88	0.95	0.99
Spain (Ceuta and Melilla)	40	44.45	226	251.09	2.63	2.91	14.88	0.97	0.97	0.89	0.80	1.00
Spain (Galicia)	45	569.11	22	282.72	2.56	2.87	1.27	0.97	0.97	0.93	0.96	1.02
Spain (La Rioja)	44	79.70	38	77.38	3.14	3.56	3.05	0.96	0.96	0.91	0.91	0.99
Spain (Madrid)	58	1 667.23	42	1 193.75	3.12	3.65	2.24	0.96	0.96	0.91	0.98	0.99
Spain (Murcia)	89	783.68	112	1 023.60	5.72	6.09	7.47	0.94	0.94	0.85	0.89	0.99
Spain (Navarra)	29	99.30	29	88.03	2.01	2.44	1.78	0.98	0.98	0.92	0.89	0.98
Sweden	146	3 359.64	41	978.91	2.89	4.75	0.84	0.95	0.95	0.93	0.96	1.02
Switzerland	209	940.10	197	1 649.32	1.15	3.08	2.02	0.97	0.97	0.89	0.95	0.98
Turkey	11	1 497.37	201	30 483.30	0.20	1.19	4.02	0.99	0.99	0.57	0.89	1.00
United Kingdom	318	17 094.23	501	22 064.73	2.44	4.62	3.15	0.95	0.95	0.87	0.95	0.96
United Kingdom (Scotland)	88	1 542.05	133	2 251.39	2.73	4.38	3.99	0.96	0.96	0.86	0.89	0.99
United States	315	170 542.22	295	151 190.32	4.81	5.16	4.27	0.95	0.95	0.82	0.90	0.94

[Part 3/4]
Table 11.1 Sampling and coverage rates

	All 15-yr olds	Enrolled 15-yr olds	Target population	School-level exclusions	Target minus school level exclusions	% school level exclusions	Est. of enrolled students from frame	Number participating students	Weighted number of participating students
Partners									
Albania	55 587	42 767	42 767	372	42 395	0.87	40 259.01	4 596	34 134.21
Argentina	688 434	636 713	636 713	2 238	634 475	0.35	607 344.01	4 774	472 106.04
Azerbaijan	185 481	184 980	184 980	1 886	183 094	1.02	168 890.37	4 727	105 886.17
Brazil	3 292 022	2 654 489	2 654 489	15 571	2 638 918	0.59	2 614 823.52	20 127	2 080 158.66
Bulgaria	80 226	70 688	70 688	1 369	69 319	1.94	57 991.47	4 507	57 832.84
Colombia	893 057	582 640	582 640	412	582 228	0.07	562 728.25	7 921	522 388.27
Croatia	48 491	46 256	46 256	535	45 721	1.16	44 925.56	4 994	43 064.90
Dubai (UAE)	10 564	10 327	10 327	167	10 160	1.62	10 144.00	5 620	9 179.12
Hong Kong-China	85 000	78 224	78 224	809	77 415	1.03	77 757.51	4 837	75 548.07
Indonesia	4 267 801	3 158 173	3 010 214	10 458	2 999 756	0.35	2 472 502.09	5 136	2 259 118.39
Jordan	117 732	107 254	107 254	0	107 254	0.00	105 905.91	6 486	104 056.04
Kazakhstan	281 659	263 206	263 206	7 210	255 996	2.74	257 426.73	5 412	250 656.73
Kyrgyzstan	116 795	93 989	91 793	1 149	90 644	1.25	89 732.54	4 986	78 492.74
Latvia	28 749	28 149	28 149	943	27 206	3.35	27 689.07	4 502	23 362.38
Liechtenstein	399	360	360	5	355	1.39	356.00	329	355.00
Lithuania	51 822	43 967	43 967	522	43 445	1.19	42 554.50	4 528	40 530.17
Macao-China	7 500	5 969	5 969	3	5 966	0.05	5 966.00	5 952	5 978.00
Montenegro	8 500	8 493	8 493	10	8 483	0.12	8 527.07	4 825	7 728.45
Panama	57 919	43 623	43 623	501	43 122	1.15	40 426.12	3 969	30 510.02
Peru	585 567	491 514	490 840	984	489 856	0.20	480 639.83	5 985	427 606.84
Qatar	10 974	10 665	10 665	114	10 551	1.07	10 507.00	9 078	9 806.38
Romania	152 084	152 084	152 084	679	151 405	0.45	150 114.40	4 776	151 129.84
Russian Federation	1 673 085	1 667 460	1 667 460	25 012	1 642 448	1.50	1 392 764.87	5 308	1 290 046.90
Serbia	85 121	75 128	73 628	1 580	72 048	2.15	71 524.47	5 523	70 796.13
Shanghai-China	112 000	100 592	100 592	1 287	99 305	1.28	99 514.21	5 115	97 044.71
Singapore	54 982	54 212	54 212	633	53 579	1.17	53 591.77	5 283	51 874.00
Chinese Taipei	329 249	329 189	329 189	1 778	327 411	0.54	324 141.27	5 831	297 203.36
Thailand	949 891	763 679	763 679	8 438	755 241	1.10	752 193.36	6 225	691 916.43
Trinidad and Tobago	19 260	17 768	17 768	0	17 768	0.00	17 673.00	4 778	14 938.27
Tunisia	153 914	153 914	153 914	0	153 914	0.00	153 197.60	4 955	136 544.67
Uruguay	53 801	43 281	43 281	30	43 251	0.07	43 399.59	5 957	33 970.6



[Part 4/4]
Table 11.1 Sampling and coverage rates

	Total number excluded students	Total weighted number of excluded students	Total number ineligible students	Total weighted number of ineligible students	Within school exclusion rate (%)	Overall exclusion rate (%)	Percentage ineligible / withdrawn	Coverage Index				
								1	2	3	4	5
Partners												
Albania	0	0.00	104	779.05	0.00	0.87	2.28	0.99	0.99	0.61	0.85	0.95
Argentina	14	1 225.37	261	24 494.30	0.26	0.61	5.17	0.99	0.99	0.69	0.78	0.96
Azerbaijan	0	0.00	0	0.00	0.00	1.02	0.00	0.99	0.99	0.57	0.63	0.92
Brazil	24	2 692.15	1 392	107 614.54	0.13	0.72	5.17	0.99	0.99	0.63	0.80	0.99
Bulgaria	0	0.00	12	118.70	0.00	1.94	0.21	0.98	0.98	0.72	1.00	0.84
Colombia	11	490.49	397	24 674.09	0.09	0.16	4.72	1.00	1.00	0.58	0.93	0.97
Croatia	34	273.09	72	564.28	0.63	1.78	1.30	0.98	0.98	0.89	0.96	0.98
Dubai (UAE)	5	6.68	125	208.20	0.07	1.69	2.27	0.98	0.98	0.87	0.91	1.00
Hong Kong-China	9	118.74	80	1 319.15	0.16	1.19	1.74	0.99	0.99	0.89	0.97	1.00
Indonesia	0	0.00	0	0.00	0.00	0.35	0.00	1.00	0.95	0.53	0.91	0.82
Jordan	24	442.88	313	4 968.71	0.42	0.42	4.75	1.00	1.00	0.88	0.99	0.99
Kazakhstan	82	3 843.62	76	3 445.90	1.51	4.21	1.35	0.96	0.96	0.89	0.99	1.01
Kyrgyzstan	86	1 384.09	97	1 462.88	1.73	2.96	1.83	0.97	0.95	0.67	0.89	0.99
Latvia	19	101.54	32	138.53	0.43	3.77	0.59	0.96	0.96	0.81	0.85	1.02
Liechtenstein	0	0.00	1	1.00	0.00	1.39	0.28	0.99	0.99	0.89	1.00	1.00
Lithuania	74	631.68	54	430.59	1.53	2.70	1.05	0.97	0.97	0.78	0.97	0.98
Macao-China	0	0.00	18	18.00	0.00	0.05	0.30	1.00	1.00	0.80	1.00	1.00
Montenegro	0	0.00	62	89.71	0.00	0.12	1.16	1.00	1.00	0.91	0.91	1.01
Panama	0	0.00	242	2 252.46	0.00	1.15	7.38	0.99	0.99	0.53	0.75	0.94
Peru	9	557.97	377	27 057.13	0.13	0.33	6.32	1.00	1.00	0.73	0.89	0.98
Qatar	28	28.00	405	405.90	0.28	1.35	4.13	0.99	0.99	0.89	0.94	1.00
Romania	0	0.00	23	647.92	0.00	0.45	0.43	1.00	1.00	0.99	1.01	0.99
Russian Federation	59	15 247.03	72	15 699.23	1.17	2.65	1.20	0.97	0.97	0.77	0.94	0.85
Serbia	10	132.53	96	1 097.78	0.19	2.33	1.55	0.98	0.96	0.83	0.99	0.99
Shanghai-China	7	130.18	44	848.43	0.13	1.41	0.87	0.99	0.99	0.87	0.98	1.00
Singapore	48	416.70	128	1 056.20	0.80	1.96	2.02	0.98	0.98	0.94	0.98	1.00
Chinese Taipei	32	1 661.54	111	5 319.78	0.56	1.09	1.78	0.99	0.99	0.90	0.92	0.99
Thailand	6	457.91	210	23 150.04	0.07	1.17	3.34	0.99	0.99	0.73	0.92	1.00
Trinidad and Tobago	11	35.88	311	875.51	0.24	0.24	5.85	1.00	1.00	0.78	0.85	0.99
Tunisia	7	183.81	148	3 836.52	0.13	0.13	2.81	1.00	1.00	0.89	0.89	1.00
Uruguay	14	66.58	849	3 983.10	0.20	0.26	11.70	1.00	1.00	0.63	0.78	1.00

Notes:

Germany (3 states only) used modal grade 9 data to estimate school-level PISA enrolment.

Finland used modal grade 9 data to estimate school-level PISA enrolment.

Iceland used modal grade 10 data to estimate school-level PISA enrolment.

Italy (just some schools) used modal grade 10 data to estimate school-level PISA enrolment.

Jordan used modal grade 10 data to estimate school-level PISA enrolment.

Sweden used modal grade 9 data to estimate school-level PISA enrolment.

Uruguay (private schools only) used modal grade 10 data to estimate school-level PISA enrolment.

Azerbaijan, Norway, Singapore (private schools only), Thailand, and the United States applied known proportions of 15-year-olds to corresponding grades to estimate school-level PISA enrolment.

Indonesia PISA enrolment data was estimated as total enrolment/grades using data from 2004/2005 school year.

Greece and the United States had PISA enrolment data based on the 2005/2006 school year.

Panama and Switzerland had PISA enrolment data based on the 2006/2007 school year.

Peru had estimated PISA enrolment data for some schools only.

Iceland excluded 3 students for unknown reasons (no SEN code).



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.

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 sampling frame.

With the use of probability proportional to size sampling, in participating countries with few certainty school selections and no over-sampling or under-sampling 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

$$\text{weighted school response rate}_{\text{before replacement}} = \frac{\sum_{i \in Y} W_i E_i}{\sum_{i \in (Y \cup N)} W_i E_i}$$

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.

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

11.2

$$\text{weighted school response rate}_{\text{after replacement}} = \frac{\sum_{i \in (Y \cup R)} W_i E_i}{\sum_{i \in (Y \cup R \cup N)} W_i E_i}$$

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. The exception is cases where participating countries applied different sampling rates across explicit strata. In these cases, unweighted rates were calculated in each stratum, and then weighted together according to the relative population size of 15-year-old students in each stratum.



[Part 1/2]
Table 11.2 School response rates before replacement

	Weighted school participation rate before replacement (%) (SCHRRW1)	Weighted number of responding schools (weighted also by enrolment) (NUMW1)	Weighted number of schools sampled (responding + non-responding) (weighted also by enrolment) (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	97.78	265 659.34	271 695.64	95.80	342	357
Austria	93.94	88 550.88	94 260.56	96.22	280	291
Belgium	88.76	112 593.58	126 851.21	87.33	255	292
Belgium (Flemish Community)	80.34	56 820.81	70 722.91	79.65	137	172
Canada	88.04	362 151.82	411 343.27	89.21	893	1 001
Chile	94.34	245 582.85	260 330.55	94.03	189	201
Czech Republic	83.09	94 695.67	113 960.78	83.70	226	270
Denmark	83.94	55 375.19	65 967.28	81.23	264	325
Estonia	100.00	13 230.16	13 230.16	100.00	175	175
Finland	98.65	62 892.37	63 751.48	98.53	201	204
France	94.14	658 769.37	699 775.90	93.79	166	177
Germany	98.61	826 579.24	838 259.48	98.67	223	226
Greece	98.19	98 709.77	100 528.92	98.37	181	184
Hungary	98.21	101 522.64	103 378.07	96.84	184	190
Iceland	98.46	4 488.00	4 558.00	91.49	129	141
Ireland	87.18	48 820.53	55 997.41	86.88	139	160
Israel	92.03	103 141.38	112 068.76	91.40	170	186
Italy	94.27	532 432.06	564 811.20	95.13	1 054	1 108
Japan	87.77	999 408.28	1 138 693.53	87.24	171	196
Korea	100.00	683 793.03	683 793.03	100.00	157	157
Luxembourg	100.00	5 437.00	5 437.00	100.00	39	39
Mexico	95.62	1 338 290.71	1 399 638.41	96.92	1 512	1 560
Netherlands	80.40	154 471.19	192 139.64	79.90	155	194
New Zealand	84.11	49 916.60	59 344.11	82.68	148	179
Norway	89.61	55 483.70	61 919.76	88.41	183	207
Poland	88.16	409 513.05	464 534.79	85.03	159	187
Portugal	93.61	102 225.14	109 204.60	93.06	201	216
Slovak Republic	93.33	67 283.88	72 092.30	94.24	180	191
Slovenia	98.36	19 797.63	20 126.72	95.74	337	352
Spain	99.53	422 691.64	424 705.47	99.55	888	892
Spain (Andalusia)	100.00	90 195.46	90 195.46	100.00	51	51
Spain (Aragon)	100.00	11 792.97	11 792.97	100.00	52	52
Spain (Asturias)	100.00	7 544.12	7 544.12	100.00	54	54
Spain (Balearic Islands)	100.00	9 743.05	9 743.05	100.00	52	52
Spain (Basque Country)	100.00	16 390.44	16 390.44	100.00	177	177
Spain (Canary Islands)	97.95	19 703.80	20 116.78	98.04	50	51
Spain (Cantabria)	100.00	4 575.13	4 575.13	100.00	51	51
Spain (Castile and Leon)	100.00	20 228.07	20 228.07	100.00	51	51
Spain (Catalonia)	97.92	61 066.87	62 360.90	98.00	49	50
Spain (Ceuta and Melilla)	100.00	2 123.00	2 123.00	100.00	21	21
Spain (Galicia)	100.00	23 157.71	23 157.71	100.00	54	54
Spain (La Rioja)	100.00	2 775.00	2 775.00	100.00	46	46
Spain (Madrid)	100.00	54 405.87	54 405.87	100.00	51	51
Spain (Murcia)	100.00	15 394.36	15 394.36	100.00	51	51
Spain (Navarra)	94.49	5 262.99	5 569.80	96.08	49	51
Sweden	99.91	120 693.08	120 801.61	98.95	189	191
Switzerland	94.25	81 005.40	85 951.73	96.27	413	429
Turkey	100.00	849 830.25	849 830.25	100.00	170	170
United Kingdom	71.06	523 270.93	736 340.73	76.14	418	549
United Kingdom (Scotland)	79.83	50 358.31	63 083.03	79.82	87	109
United States	67.83	2 673 852.30	3 941 908.48	67.31	140	208

[Part 2/2]
Table 11.2 School response rates before replacement

	Weighted school participation rate before replacement (%) (SCHRRW1)	Weighted number of responding schools (weighted also by enrolment) (NUMW1)	Weighted number of schools sampled (responding + non-responding) (weighted also by enrolment) (DENW1)	Unweighted school participation rate before replacement (%) (SCHRRU1)	Number of responding schools (unweighted) (NUMU1)	Number of responding and non-responding schools (unweighted) (DENU1)
Partners						
Albania	97.29	39 168.33	40 259.01	97.25	177	182
Argentina	97.18	590 214.69	607 344.01	97.49	194	199
Azerbaijan	99.86	168 645.87	168 890.37	99.38	161	162
Brazil	93.13	2 435 250.12	2 614 823.52	92.11	899	976
Bulgaria	98.16	56 922.34	57 991.47	97.19	173	178
Colombia	90.21	507 649.30	562 728.25	91.23	260	285
Croatia	99.19	44 560.98	44 925.56	98.74	157	159
Dubai (UAE)	100.00	10 144.00	10 144.00	100.00	190	190
Hong Kong-China	69.19	53 799.82	77 757.51	69.23	108	156
Indonesia	94.54	2 337 438.46	2 472 502.09	93.99	172	183
Jordan	100.00	105 905.91	105 905.91	100.00	210	210
Kazakhstan	100.00	257 426.73	257 426.73	100.00	199	199
Kyrgyzstan	98.53	88 412.13	89 732.54	98.28	171	174
Latvia	97.46	26 986.21	27 689.07	97.30	180	185
Liechtenstein	100.00	356.00	356.00	100.00	12	12
Lithuania	98.13	41 759.13	42 554.50	97.46	192	197
Macao-China	100.00	5 966.00	5 966.00	100.00	45	45
Montenegro	100.00	8 527.07	8 527.07	100.00	52	52
Panama	82.58	33 384.08	40 426.12	81.82	180	220
Peru	100.00	480 639.83	480 639.83	100.00	240	240
Qatar	97.30	10 223.00	10 507.00	96.75	149	154
Romania	100.00	150 114.40	150 114.40	100.00	159	159
Russian Federation	100.00	1 392 764.87	1 392 764.87	100.00	213	213
Serbia	99.21	70 960.22	71 524.47	98.95	189	191
Shanghai-China	99.32	98 840.73	99 514.21	99.34	151	152
Singapore	96.19	51 552.46	53 591.77	96.00	168	175
Chinese Taipei	99.34	322 004.60	324 141.27	99.37	157	158
Thailand	98.01	737 224.68	752 193.36	97.83	225	230
Trinidad and Tobago	97.21	17 180.00	17 673.00	96.88	155	160
Tunisia	100.00	153 197.60	153 197.60	100.00	165	165
Uruguay	98.66	42 819.65	43 399.59	98.28	229	233

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 over-sampling 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.



[Part 1/2]
Table 11.3 School response rates after replacement

	"Weighted school participation rate after all replacement (%) (SCHRRW3)"	Weighted number of responding schools (weighted also by enrolment) (NUMW3)	"Weighted number of schools sampled (responding + non-responding) (weighted also by enrolment) (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	98.85	268 780.10	271 917.51	96.64	345	357
Austria	93.94	88 550.88	94 260.56	96.22	280	291
Azerbaijan	100.00	168 890.37	168 890.37	100.00	162	162
Belgium	95.58	121 290.83	126 898.69	94.18	275	292
Belgium (Flemish Community)	92.25	65 241.05	70 722.91	90.70	156	172
Canada	89.64	368 708.48	411 343.27	90.71	908	1 001
Chile	99.04	257 594.19	260 098.68	99.00	199	201
Czech Republic	97.40	111 091.29	114 061.61	96.30	260	270
Denmark	90.75	59 860.38	65 964.33	87.69	285	325
Estonia	100.00	13 230.16	13 230.16	100.00	175	175
Finland	100.00	63 748.48	63 751.48	99.51	203	204
France	94.14	658 769.37	699 775.90	93.79	166	177
Germany	100.00	838 259.48	838 259.48	100.00	226	226
Greece	99.40	99 925.22	100 528.92	99.46	183	184
Iceland	98.46	4 488.00	4 558.00	91.49	129	141
Ireland	88.44	49 525.81	55 997.41	88.13	141	160
Israel	95.40	106 917.54	112 068.76	94.62	176	186
Italy	99.08	559 546.08	564 768.10	98.83	1 095	1 108
Japan	94.99	1 081 662.02	1 138 693.53	94.39	185	196
Korea	100.00	683 793.03	683 793.03	100.00	157	157
Luxembourg	100.00	5 437.00	5 437.00	100.00	39	39
Mexico	97.71	1 367 668.22	1 399 729.69	98.14	1 531	1 560
Netherlands	95.54	183 555.39	192 118.15	95.36	185	194
New Zealand	91.00	54 130.38	59 484.57	89.94	161	179
Norway	96.53	59 759.07	61 909.04	95.17	197	207
Poland	97.70	453 855.21	464 534.79	95.72	179	187
Portugal	98.43	107 534.84	109 250.81	98.15	212	216
Slovak Republic	99.01	71 387.78	72 104.57	98.95	189	191
Slovenia	98.36	19 797.63	20 126.72	95.74	337	352
Spain	99.53	422 691.64	424 705.47	99.55	888	892
Spain (Andalusia)	100.00	90 195.46	90 195.46	100.00	51	51
Spain (Aragon)	100.00	11 792.97	11 792.97	100.00	52	52
Spain (Asturias)	100.00	7 544.12	7 544.12	100.00	54	54
Spain (Balearic Islands)	100.00	9 743.05	9 743.05	100.00	52	52
Spain (Basque Country)	100.00	16 390.44	16 390.44	100.00	177	177
Spain (Canary Islands)	97.95	19 703.80	20 116.78	98.04	50	51
Spain (Cantabria)	100.00	4 575.13	4 575.13	100.00	51	51
Spain (Castile and Leon)	100.00	20 228.07	20 228.07	100.00	51	51
Spain (Catalonia)	97.92	61 066.87	62 360.90	98.00	49	50
Spain (Ceuta and Melilla)	100.00	2 123.00	2 123.00	100.00	21	21
Spain (Galicia)	100.00	23 157.71	23 157.71	100.00	54	54
Spain (La Rioja)	100.00	2 775.00	2 775.00	100.00	46	46
Spain (Madrid)	100.00	54 405.87	54 405.87	100.00	51	51
Spain (Murcia)	100.00	15 394.36	15 394.36	100.00	51	51
Spain (Navarra)	94.49	5 262.99	5 569.80	96.08	49	51
Sweden	99.91	120 693.08	120 801.61	98.95	189	191
Switzerland	98.71	84 896.21	86 006.21	99.07	425	429
Turkey	100.00	849 830.25	849 830.25	100.00	170	170
United Kingdom	87.35	643 026.62	736 178.40	87.61	481	549
United Kingdom (Scotland)	89.00	56 142.79	63 083.03	88.99	97	109
United States	77.50	3 065 650.60	3 955 606.40	76.92	160	208

[Part 2/2]

Table 11.3 School response rates after replacement

	"Weighted school participation rate after all replacement (%) (SCHRRW3)" ^a	Weighted number of responding schools (weighted also by enrolment) (NUMW3)	"Weighted number of schools sampled (responding + non-responding) (weighted also by enrolment) (DENW3)" ^a	"Unweighted school participation rate after all replacement (%) (SCHRRU3)" ^a	Number of responding schools (unweighted) (NUMU3)	Number of responding and non-responding schools (unweighted) (DENU3)
Partners						
Albania	99.37	39 998.90	40 252.52	99.45	181	182
Argentina	99.42	603 817.38	607 344.01	99.50	198	199
Brazil	94.75	2 477 518.43	2 614 805.58	94.88	926	976
Bulgaria	99.10	57 823.36	58 345.89	98.88	176	178
Colombia	94.90	533 899.44	562 586.86	96.14	274	158
Croatia	99.86	44 861.56	44 925.56	99.37	158	285
Dubai (UAE)	100.00	10 144.00	10 144.00	100.00	190	190
Hong Kong-China	96.75	75 231.56	77 757.51	96.79	151	159
Hungary	99.47	103 066.87	103 617.75	98.42	187	156
Indonesia	100.00	2 473 527.93	2 473 527.93	100.00	183	190
Jordan	100.00	105 905.91	105 905.91	100.00	210	183
Kazakhstan	100.00	257 426.73	257 426.73	100.00	199	210
Kyrgyzstan	99.47	89 259.77	89 732.54	99.43	173	199
Latvia	99.39	27 543.66	27 713.30	99.46	184	174
Liechtenstein	100.00	356.00	356.00	100.00	12	185
Lithuania	99.91	42 525.97	42 564.17	99.49	196	12
Macao-China	100.00	5 966.00	5 966.00	100.00	45	197
Montenegro	100.00	8 527.07	8 527.07	100.00	52	45
Panama	83.76	33 778.97	40 328.55	83.18	183	52
Peru	100.00	480 639.83	480 639.83	100.00	240	220
Qatar	97.30	10 223.00	10 507.00	96.75	149	240
Romania	100.00	150 114.40	150 114.40	100.00	159	154
Russian Federation	100.00	1 392 764.87	1 392 764.87	100.00	213	159
Serbia	99.97	71 504.47	71 524.47	99.48	190	213
Shanghai-China	100.00	99 514.21	99 514.21	100.00	152	191
Singapore	97.88	52 453.83	53 591.77	97.71	171	152
Chinese Taipei	100.00	324 141.27	324 141.27	100.00	158	175
Thailand	100.00	752 391.58	752 391.58	100.00	230	230
Trinidad and Tobago	97.21	17 180.00	17 673.00	96.88	155	160
Tunisia	100.00	153 197.60	153 197.60	100.00	165	165
Uruguay	98.66	42 819.65	43 399.59	98.28	229	233

[Part 1/2]

Table 11.4 Student response rates after replacement

	"Weighted student participation rate after second replacement (%) (STURRW3)" ^a	"Number of students assessed (weighted) (NUMSTW3)" ^a	"Number of students sampled (assessed + absent) (weighted) (DENSTW3)" ^a	Unweighted student participation rate after second replacement (%) (STURRU3)	"Number of students assessed (unweighted) (NUMSTU3)" ^a	"Number of students sampled (assessed + absent) (unweighted) (DENSTU3)" ^a
OECD						
Australia	86.05	205 234.15	238 498.29	83.18	14 060	16 903
Austria	88.63	72 792.60	82 135.17	86.57	6 568	7 587
Azerbaijan	99.14	105 094.66	106 007.50	99.24	4 691	4 727
Belgium	91.38	104 262.95	114 096.74	91.69	8 477	9 245
Belgium (Flemish Community)	92.44	56 274.15	60 873.27	92.54	4 577	4 946
Canada	79.52	257 905.04	324 342.38	81.09	22 383	27 603
Chile	92.88	227 540.78	244 995.46	92.88	5 663	6 097
Czech Republic	90.75	100 684.69	110 952.60	90.88	6 049	6 656
Denmark	89.29	49 235.89	55 139.41	86.77	5 924	6 827
Estonia	94.06	12 207.69	12 977.98	94.11	4 727	5 023
Finland	92.27	56 709.20	61 460.12	92.09	5 810	6 309
France	87.12	556 054.05	638 284.32	87.18	4 272	4 900
Germany	93.93	720 447.33	766 992.57	93.78	4 979	5 309
Greece	95.95	88 875.18	92 631.22	95.97	4 957	5 165
Iceland	83.91	3 635.00	4 332.00	83.91	3 635	4 332
Ireland	83.81	39 247.61	46 830.33	83.71	3 896	4 654
Israel	89.45	88 480.15	98 918.40	89.46	5 761	6 440
Italy	92.13	462 655.23	502 190.00	92.47	30 876	33 390
Japan	95.32	1 010 801.31	1 060 381.66	95.30	6 077	6 377
Korea	98.76	622 186.80	630 030.35	98.66	4 989	5 057
Luxembourg	95.57	4 897.00	5 124.00	95.63	4 622	4 833
Mexico	95.13	1 214 826.92	1 276 981.82	95.23	38 213	40 125
Netherlands	89.78	157 912.04	175 896.96	89.80	4 747	5 286
New Zealand	84.65	42 451.62	50 149.05	84.11	4 606	5 476



[Part 2/2]

Table 11.4 Student response rates after replacement

	"Weighted student participation rate after second replacement (%) (STURRW3) ^a	"Number of students assessed (weighted) (NUMSTW3) ^a	"Number of students sampled (assessed + absent) (weighted) (DENSTW3) ^a	Unweighted student participation rate after second replacement (%) (STURRU3)	"Number of students assessed (unweighted) (NUMSTU3) ^a	"Number of students sampled (assessed + absent) (unweighted) (DENSTU3) ^a
OECD						
Norway	89.92	49 785.30	55 365.51	89.72	4 660	5 194
Poland	85.87	376 766.79	438 739.13	85.57	4 855	5 674
Portugal	87.11	83 093.83	95 386.14	87.36	6 263	7 169
Slovak Republic	93.03	63 853.62	68 634.33	93.00	4 555	4 898
Slovenia	90.92	16 776.72	18 452.74	91.09	6 135	6 735
Spain	89.60	345 122.11	385 164.28	91.48	25 871	28 280
Spain (Andalusia)	88.74	71 785.12	80 895.37	88.72	1 416	1 596
Spain (Aragon)	89.53	9 529.74	10 644.27	89.64	1 514	1 689
Spain (Asturias)	91.83	6 487.75	7 064.66	91.81	1 536	1 673
Spain (Balearic Islands)	87.90	7 788.58	8 861.19	88.03	1 463	1 662
Spain (Basque Country)	95.89	14 835.39	15 470.74	95.82	4 768	4 976
Spain (Canary Islands)	88.56	15 364.56	17 348.50	88.83	1 448	1 630
Spain (Cantabria)	93.14	4 024.57	4 321.04	93.06	1 516	1 629
Spain (Castile and Leon)	94.01	17 633.22	18 757.58	94.10	1 515	1 610
Spain (Catalonia)	87.44	47 957.34	54 845.85	87.39	1 365	1 562
Spain (Ceuta and Melilla)	92.45	1 519.42	1 643.46	92.38	1 370	1 483
Spain (Galicia)	92.24	19 979.76	21 661.55	92.31	1 585	1 717
Spain (La Rioja)	89.64	2 201.53	2 455.92	90.26	1 288	1 427
Spain (Madrid)	88.56	45 784.75	51 696.45	88.60	1 453	1 640
Spain (Murcia)	88.77	11 471.36	12 922.74	88.66	1 321	1 490
Spain (Navarra)	93.38	4 273.99	4 577.16	94.06	1 504	1 599
Sweden	92.97	105 025.54	112 972.14	92.98	4 567	4 912
Switzerland	93.58	74 711.62	79 836.07	94.10	11 810	12 551
Turkey	97.85	741 028.64	757 297.66	97.81	4 996	5 108
United Kingdom	86.96	520 120.67	598 109.68	86.63	12 168	14 046
United Kingdom (Scotland)	83.61	40 832.44	48 833.93	83.60	2 620	3 134
United States	86.99	2 298 889.40	2 642 597.98	86.79	5 165	5 951
Partners						
Albania	95.39	32 347.17	33 911.29	95.14	4 596	4 831
Argentina	88.25	414 166.32	469 284.74	87.81	4 762	5 423
Brazil	89.04	1 767 871.92	1 985 479.43	87.61	19 901	22 715
Bulgaria	97.34	56 095.50	57 629.92	97.44	4 499	4 617
Colombia	92.83	462 601.93	498 330.60	93.25	7 910	8 483
Croatia	93.76	40 320.63	43 006.12	93.77	4 994	5 326
Dubai (UAE)	90.39	8 297.15	9 179.12	90.38	5 620	6 218
Hong Kong-China	93.19	68 141.94	73 125.24	93.11	4 837	5 195
Hungary	93.25	97 922.94	105 015.21	92.92	4 605	4 956
Indonesia	96.91	2 189 287.41	2 259 118.39	96.67	5 136	5 313
Jordan	95.85	99 734.18	104 056.04	95.71	6 486	6 777
Kazakhstan	98.49	246 871.69	250 656.73	98.60	5 412	5 489
Kyrgyzstan	98.04	76 523.26	78 054.25	98.03	4 986	5 086
Latvia	91.27	21 241.28	23 272.68	91.32	4 502	4 930
Liechtenstein	92.68	329.00	355.00	92.68	329	355
Lithuania	93.36	37 807.98	40 495.06	93.28	4 528	4 854
Macao-China	99.57	5 952.00	5 978.00	99.57	5 952	5 978
Montenegro	95.43	7 375.42	7 728.45	95.32	4 825	5 062
Panama	88.67	22 666.48	25 562.20	87.95	3 913	4 449
Peru	96.35	412 010.97	427 606.84	96.28	5 985	6 216
Qatar	93.63	8 990.00	9 602.00	93.63	8 990	9 602
Romania	99.47	150 330.73	151 129.84	99.44	4 776	4 803
Russian Federation	96.77	1 248 353.40	1 290 046.90	96.47	5 308	5 502
Serbia	95.37	67 495.75	70 775.28	95.14	5 522	5 804
Shanghai-China	98.89	95 966.24	97 044.71	98.84	5 115	5 175
Singapore	91.04	46 224.01	50 774.70	90.95	5 283	5 809
Chinese Taipei	95.30	283 239.28	297 203.36	95.46	5 831	6 108
Thailand	97.37	673 688.15	691 916.43	97.33	6 225	6 396
Trinidad and Tobago	85.92	12 275.35	14 287.08	85.74	4 731	5 518
Tunisia	96.93	132 354.41	136 544.67	96.91	4 955	5 113
Uruguay	87.03	29 192.55	33 541.33	86.93	5 924	6 815



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). 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

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

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

$$\sigma_{(\hat{\mu})} = \sqrt{\frac{\sigma_{schools}^2}{n_{schools}} + \frac{\sigma_{within}^2}{n_{schools} n_{students}}}$$

The standard error for the mean from a simple random sample is inversely proportional to 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 number of selected schools and 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

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

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 11.5 provides the standard errors on the PISA 2009 reading scale if the participating country sample was selected according to: *i*) a simple random sample; *ii*) a multistage procedure without using complementary information (unstratified multistage sampling); and *iii*) the BRR estimate for the actual PISA 2009 design, using Fay's method. It



should be mentioned that the plausible value imputation variance was not included in these computations and thus only reflects sampling error.

Note that the values in Table 11.5 for the standard errors for the unstratified multistage design are overestimates for countries that had a school census (Iceland, Liechtenstein, Luxembourg, Macao-China, Qatar, Trinidad and Tobago, and Dubai [UAE]) since these standard error estimates assume a sample of schools was collected.

Also note that in some of the countries where the unbiased values in Table 11.5 are greater than the values for the unstratified multistage sample, this is because of regional or other oversampling (Brazil, Colombia [two regions], Mexico and Spain).

The unbiased values in Table 11.5 are also greater than the values for the unstratified multistage sample for Finland, Indonesia, the Netherlands, Norway and Panama. As described in the sampling design chapter, some countries have a substantial proportion of students attending schools with fewer than the TCS. Very small schools were undersampled while schools in all large school strata were slightly oversampled. For Panama, they were undersampled by 4.

For the other instances of countries in Table 11.5 that have unbiased estimates that are somewhat greater than estimates based on an unstratified multistage design there is no ready explanation except perhaps the fact that these estimates are based on samples and are therefore subject to random variation. However, this suggests that the stratification undertaken possibly did not explain enough between-school variance in these countries.

[Part 1/2]
Table 11.5 Standard errors for the PISA 2009 reading scale

	Simple random sample	Unstratified multi-stage sample	BRR estimate for PISA sample
OECD			
Australia	0.829	2.609	2.337
Austria	1.234	4.826	2.948
Belgium	1.104	4.876	2.350
Canada	0.593	1.499	1.483
Chile	1.098	4.593	3.125
Czech Republic	1.185	4.603	2.892
Denmark	1.086	2.317	2.074
Estonia	1.211	3.185	2.635
Finland	1.134	2.113	2.254
France	1.610	6.296	3.442
Germany	1.343	5.176	2.656
Greece	1.350	4.704	4.322
Hungary	1.329	5.900	3.175
Iceland	1.589	3.813	1.409
Ireland	1.517	4.187	2.972
Israel	1.469	6.003	3.634
Italy	0.545	2.243	1.572
Japan	1.286	5.316	3.466
Korea	1.121	3.789	3.461
Luxembourg	1.526	9.765	1.253
Mexico	0.433	1.470	1.953
Netherlands	1.285	5.115	5.150
New Zealand	1.509	3.932	2.353
Norway	1.336	2.487	2.581
Poland	1.272	2.972	2.605
Portugal	1.094	3.546	3.067
Slovak Republic	1.337	4.480	2.544
Slovenia	1.158	4.114	1.032
Spain	0.544	1.495	2.020
Sweden	1.460	3.200	2.880
Switzerland	0.860	2.741	2.444
Turkey	1.159	5.014	3.521
United Kingdom	0.864	2.286	2.280
United States	1.335	3.888	3.654

[Part 2/2]

Table 11.5 Standard errors for the PISA 2009 reading scale

	Simple random sample	Unstratified multi-stage sample	BRR estimate for PISA sample
Partners			
Albania	1.473	4.204	4.036
Argentina	1.567	5.877	4.634
Azerbaijan	1.103	4.117	3.329
Brazil	0.663	2.063	2.728
Bulgaria	1.687	7.044	6.681
Colombia	0.973	3.485	3.743
Croatia	1.239	4.750	2.871
Dubai (UAE)	1.424	6.022	1.142
Hong Kong-China	1.208	4.515	2.117
Indonesia	0.928	3.461	3.735
Jordan	1.127	3.867	3.308
Kazakhstan	1.237	4.144	3.072
Kyrgyzstan	1.399	5.024	3.191
Latvia	1.192	3.073	2.957
Liechtenstein	4.579	15.330	2.800
Lithuania	1.285	3.655	2.391
Macao-China	0.987	7.003	0.892
Montenegro	1.338	7.585	1.716
Panama	1.576	5.563	6.541
Peru	1.271	4.752	3.951
Qatar	1.211	7.067	0.765
Romania	1.303	5.502	4.095
Russian Federation	1.232	3.443	3.336
Serbia	1.127	4.103	2.433
Shanghai-China	1.121	4.402	2.397
Singapore	1.341	4.500	1.056
Chinese Taipei	1.130	4.210	2.596
Thailand	0.911	3.318	2.640
Trinidad and Tobago	1.634	7.387	1.236
Tunisia	1.210	4.560	2.880
Uruguay	1.287	4.438	2.604

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:

$$11.6 \quad D_{eff}(t) = \frac{Var_{BRR}(t)}{Var_{SRS}(t)}$$

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 base but considering the sample as a simple random sample.



Based on Table 11.5, the standard error on the mean estimate in reading in Australia is equal to 2.34 (rounded from 2.337). As the standard deviation of the reading performance is equal to 98.91, the design effect in Australia for the mean estimate in reading is therefore equal to:

11.7

$$Deff(t) = \frac{Var_{BRR}(t)}{Var_{SRS}(t)} = \frac{(2.34)^2}{[(98.91)^2 / 14251]} = 7.98$$

The sampling variance on the reading performance mean in Australia is about eight times larger than it would have been with a simple random sample of the same sample size.

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 reading performance mean is equal to:

11.9

$$Effn(t) = \frac{n}{Deff(t)} = \frac{n \times Var_{SRS}(t)}{Var_{BRR}(t)} = \frac{(98.91)^2}{(2.34)^2} = 1786.7$$

In other words, a simple random sample of 1 787 students in Australia would have been as precise as the actual PISA 2009 sample for the estimation of the reading performance, for the national estimate of mean reading 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. There are no reasons why students in academic schools should be taller than students in vocational schools, at least if there is no interaction between tracks and gender. For this particular variable, the expected value of the 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 report, *PISA 2009 Results* (OECD, 2010b) that involves performance variables (plausible values) 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 t , 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

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

where $MVar(t)$ is the measurement error variance for the statistic t . 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. Table 11.6 provides, per domain and per cycle, the design effect 1 values, for any country that participated in at least one PISA cycle. Table 11.7 provides the corresponding effective sample size.

Design effect 2

11.11

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

shows the inflation of the total variance due only to the use of a complex sampling design. Table 11.8 provides, for each domain and PISA cycle, the design effect 2 values, for each participating country. Table 11.9 provides the corresponding effective sample size.

Design effect 3

11.12

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

shows the inflation of the sampling variance due to the use of a complex design. Table 11.10 provides, for each domain and PISA cycle, the design effect 3 values, for each participating country. Table 11.11 provides the corresponding effective sample size.

Design effect 4

11.13

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

shows the inflation of the total variance due to measurement error. Table 11.12 provides, for each domain and PISA cycle, the design effect 4 values, for each participating country. Table 11.13 provides the corresponding effective sample size.

Design effect 5

11.14

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

shows the inflation of the total variance due to the measurement error and due to the complex sampling design. Table 11.14 provides, for each domain and PISA cycle, the design effect 5 values, for each participating country. Table 11.15 provides the corresponding effective sample size.

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.



[Part 1/1]

Table 11.6 Design effect 1 by country, by domain and cycle

	PISA 2000			PISA 2003			PISA 2006			PISA 2009			
	Reading	Mathematics	Science	Reading	Mathematics	Science	Reading	Mathematics	Science	Reading	Mathematics	Science	
OECD	Australia	1.30	1.49	1.20	1.22	1.11	1.14	1.16	1.10	1.12	1.08	1.27	1.07
	Austria	1.06	1.01	1.07	1.10	1.14	1.09	1.09	1.19	1.12	1.14	1.12	1.08
	Belgium	1.06	1.12	1.03	1.12	1.06	1.47	1.07	1.03	1.06	1.15	1.22	1.26
	Canada	1.09	1.12	1.10	1.49	1.51	1.82	1.30	1.08	1.13	1.11	1.57	1.25
	Chile	1.12	1.34	1.38				1.17	1.28	1.08	1.29	1.14	1.14
	Czech Republic	1.07	1.03	1.08	1.35	1.21	1.58	1.10	1.14	1.06	1.23	1.11	1.09
	Denmark	1.08	1.23	1.04	1.39	1.24	1.29	1.16	1.19	1.17	1.11	1.09	1.32
	Estonia							1.07	1.07	1.15	1.21	1.16	1.27
	Finland	1.14	1.25	1.24	1.16	1.25	1.28	1.12	1.60	1.23	1.05	1.01	1.14
	France	1.12	1.21	1.25	1.16	1.12	1.26	1.05	1.20	1.02	1.04	1.10	1.05
	Germany	1.13	1.06	1.22	1.05	1.01	1.12	1.07	1.14	1.08	1.08	1.20	1.06
	Greece	1.19	1.24	1.02	1.52	1.10	1.96	1.08	1.09	1.40	1.31	1.21	1.60
	Hungary	1.03	1.04	1.05	1.12	1.20	1.45	1.25	1.27	1.10	1.00	1.07	1.05
	Iceland	1.11	1.25	1.03	1.14	1.06	1.05	1.62	1.56	1.12	1.03	1.13	1.03
	Ireland	1.11	1.07	1.02	1.13	1.11	1.25	1.30	1.21	1.30	1.02	1.02	1.15
	Israel	1.47	1.15	1.33				1.12	1.23	1.04	1.26	1.06	1.29
	Italy	1.16	1.32	1.05	1.90	1.78	1.20	1.19	1.29	1.10	1.23	1.21	1.52
	Japan	1.11	1.10	1.17	1.31	1.09	1.10	1.17	1.03	1.05	1.06	1.09	1.11
	Korea	1.13	1.12	1.22	1.24	1.22	1.11	1.47	1.10	1.18	1.27	1.06	1.45
	Luxembourg	1.16	1.11	1.15	1.36	1.01	1.25	1.21	1.13	1.07	1.22	1.23	1.21
	Mexico	1.17	1.18	1.19	1.87	1.59	5.91	1.75	2.84	1.73	1.39	1.03	1.68
	Netherlands	1.06	1.08	1.02	1.29	1.09	1.29	1.36	1.19	1.18	1.14	1.07	1.21
	New Zealand	1.03	1.14	1.03	1.10	1.21	1.16	1.17	1.18	1.04	1.09	1.10	1.05
	Norway	1.06	1.24	1.06	1.26	1.03	1.14	1.10	1.13	1.06	1.20	1.13	1.21
	Poland	1.16	1.08	1.43	1.17	1.13	1.04	1.07	1.28	1.09	1.12	1.21	1.30
	Portugal	1.20	1.10	1.03	1.11	1.02	1.14	1.28	1.34	1.23	1.06	1.16	1.17
	Slovak Republic				1.03	1.14	1.02	1.13	1.43	1.13	1.10	1.03	1.10
	Slovenia							1.16	1.23	1.07	1.08	1.19	1.16
	Spain	1.17	1.03	1.04	1.83	1.36	1.38	1.33	2.18	1.92	1.10	1.68	1.29
	Sweden	1.20	1.12	1.13	1.17	1.06	1.43	1.65	1.06	1.10	1.08	1.16	1.05
	Switzerland	1.05	1.20	1.29	1.22	1.28	1.20	1.31	1.44	1.14	1.15	1.81	1.28
	Turkey				1.24	1.24	1.26	1.25	1.33	1.03	1.16	1.07	1.15
	United Kingdom	1.09	1.17	1.26	1.47	1.26	1.20	1.21	1.19	1.41	1.09	1.20	1.19
	United States	1.10	1.10	1.12	1.48	1.36	1.32	1.15	1.03	1.10	1.07	1.11	
Partners	Albania	1.07	1.17	1.34							1.03	1.38	1.14
	Argentina	1.18	1.17	1.31				1.29	1.33	1.11	1.09	1.06	1.03
	Azerbaijan							1.58	1.27	1.21	1.35	1.14	1.39
	Brazil	1.19	1.25	1.63	1.37	1.22	1.87	1.60	1.21	1.39	1.11	1.31	1.34
	Bulgaria	1.13	1.03	1.34				1.09	1.22	1.16	1.20	1.04	1.06
	Colombia							1.36	1.10	1.46	1.11	1.49	1.26
	Croatia							1.17	1.12	1.12	1.04	1.18	1.14
	Dubai (UAE)										1.03	1.06	1.15
	Hong Kong-China	1.05	1.10	1.12	1.07	1.42	1.19	1.09	1.13	1.03	1.08	1.05	1.01
	Indonesia	1.48	1.24	1.29	1.98	1.46	1.70	1.29	1.94	1.16	1.24	1.21	1.46
	Jordan							1.51	1.20	1.07	1.04	1.09	1.14
	Kazakhstan										1.15	1.25	1.09
	Kyrgyzstan							1.17	1.16	1.03	1.04	1.08	1.19
	Latvia	1.20	1.18	1.05	1.20	1.18	1.15	1.14	1.05	1.08	1.19	1.08	1.40
	Liechtenstein	1.10	1.15	1.04	1.05	1.21	1.16	1.10	1.22	1.13	1.04	1.14	1.07
	Lithuania							1.11	1.29	1.05	1.09	1.10	1.12
	Macao-China				1.29	1.05	1.19	1.21	1.39	1.09	1.24	1.08	1.45
	Macedonia	1.24	1.18	1.06							1.10	1.21	1.31
	Montenegro							1.09	1.25	1.10	1.44	1.18	1.07
	Panama											1.44	
	Peru	1.10	1.19	2.02							1.14	2.01	1.86
	Qatar							1.25	1.30	1.13	1.01	1.05	1.25
	Romania	1.25	1.14	1.15				1.40	1.39	1.07	1.01	1.31	1.09
	Russian Federation	1.16	1.15	1.14	1.22	1.28	1.15	1.42	1.23	1.08	1.15	1.06	1.22
	Serbia				1.11	1.29	1.36	1.14	1.33	1.05	1.13	1.03	1.04
	Shanghai-China										1.13	1.06	1.21
	Singapore										1.07	1.41	1.24
	Chinese Taipei							1.59	1.18	1.07	1.13	1.04	1.17
	Thailand	1.13	1.23	1.10	1.70	1.25	1.33	1.19	1.26	1.08	1.14	1.02	1.28
	Trinidad and Tobago										1.02	1.35	1.14
	Tunisia				1.48	1.05	1.10	1.10	1.19	1.03	1.08	1.10	1.10
	Uruguay				1.34	1.10	1.04	1.16	1.20	1.13	1.13	1.38	1.43

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Table 11.7 Effective sample size 1 by country, by domain and cycle

	PISA 2000			PISA 2003			PISA 2006			PISA 2009		
	Reading	Mathematics	Science									
OECD												
Australia	3 983	1 923	2 374	10 328	11 335	11 055	12 176	12 841	12 654	13 248	11 263	13 351
Austria	4 483	2 620	2 500	4 195	4 040	4 211	4 508	4 141	4 399	5 781	5 865	6 106
Belgium	6 302	3 366	3 613	7 861	8 291	5 987	8 256	8 614	8 364	7 369	6 950	6 763
Canada	27 294	14 682	15 047	18 723	18 559	15 320	17 465	21 011	20 048	20 823	14 747	18 579
Chile	4 372	2 027	1 959				4 490	4 086	4 855	4 396	4 972	4 966
Czech Republic	5 019	2 964	2 841	4 681	5 221	4 006	5 377	5 195	5 604	4 927	5 464	5 539
Denmark	3 924	1 936	2 256	3 032	3 402	3 259	3 892	3 810	3 877	5 318	5 430	4 499
Estonia							4 528	4 554	4 248	3 897	4 063	3 718
Finland	4 270	2 163	2 180	5 009	4 627	4 537	4 203	2 941	3 836	5 531	5 748	5 107
France	4 189	2 153	2 080	3 707	3 851	3 404	4 470	3 923	4 617	4 145	3 924	4 078
Germany	4 473	2 682	2 341	4 454	4 603	4 156	4 566	4 290	4 515	4 624	4 141	4 681
Greece	3 930	2 108	2 553	3 054	4 192	2 366	4 497	4 459	3 485	3 786	4 115	3 104
Hungary	4 743	2 701	2 678	4 272	3 978	3 278	3 603	3 543	4 089	4 589	4 303	4 386
Iceland	3 045	1 505	1 804	2 940	3 164	3 179	2 341	2 421	3 387	3 528	3 226	3 555
Ireland	3 474	1 984	2 097	3 434	3 483	3 096	3 528	3 804	3 530	3 860	3 842	3 411
Israel	3 063	2 161	1 884				4 077	3 739	4 390	4 578	5 422	4 475
Italy	4 280	2 101	2 629	6 123	6 555	9 668	18 288	16 892	19 776	25 080	25 573	20 376
Japan	4 753	2 655	2 489	3 595	4 308	4 296	5 086	5 774	5 680	5 744	5 607	5 484
Korea	4 413	2 470	2 264	4 379	4 457	4 898	3 519	4 706	4 388	3 938	4 727	3 449
Luxembourg	3 043	1 761	1 698	2 890	3 872	3 135	3 783	4 032	4 283	3 783	3 768	3 830
Mexico	3 945	2 181	2 149	15 998	18 839	5 074	17 696	10 894	17 861	27 507	37 285	22 717
Netherlands	2 369	1 280	1 364	3 103	3 676	3 093	3 583	4 106	4 142	4 164	4 439	3 936
New Zealand	3 549	1 793	1 974	4 102	3 742	3 892	4 122	4 073	4 629	4 276	4 207	4 408
Norway	3 895	1 857	2 181	3 215	3 946	3 570	4 253	4 153	4 439	3 868	4 142	3 850
Poland	3 158	1 823	1 425	3 748	3 894	4 222	5 167	4 344	5 105	4 394	4 067	3 795
Portugal	3 836	2 323	2 471	4 166	4 534	4 052	4 005	3 803	4 153	5 931	5 446	5 395
Slovak Republic				7 111	6 466	7 183	4 183	3 306	4 194	4 158	4 416	4 130
Slovenia							5 693	5 373	6 146	5 717	5 164	5 300
Spain	5 323	3 330	3 339	5 899	7 918	7 806	14 768	9 005	10 226	23 562	15 372	20 138
Sweden	3 669	2 207	2 163	3 960	4 362	3 240	2 690	4 180	4 044	4 247	3 939	4 335
Switzerland	5 798	2 841	2 626	6 883	6 596	7 033	9 335	8 456	10 732	10 273	6 536	9 251
Turkey				3 901	3 905	3 864	3 959	3 729	4 789	4 315	4 680	4 351
United Kingdom	8 552	4 450	4 099	6 489	7 588	7 964	10 845	11 047	9 297	11 179	10 187	10 241
United States	3 500	1 950	1 894	3 682	4 015	4 139		4 899	5 426	4 765	4 902	4 696
Partners												
Albania	4 653	2 379	2 063							4 453	3 336	4 043
Argentina	3 363	1 901	1 686				3 355	3 258	3 896	4 368	4 505	4 636
Azerbaijan							3 278	4 075	4 288	3 483	4 109	3 378
Brazil	4 112	2 175	1 660	3 244	3 639	2 381	5 804	7 668	6 672	18 197	15 308	14 970
Bulgaria	4 128	2 533	1 897				4 114	3 688	3 873	3 761	4 344	4 269
Colombia							3 305	4 054	3 074	7 142	5 334	6 309
Croatia							4 438	4 659	4 666	4 807	4 228	4 387
Dubai (UAE)										5 442	5 283	4 894
Hong Kong-China	4 199	2 223	2 181	4 171	3 162	3 777	4 281	4 108	4 488	4 474	4 598	4 779
Indonesia	4 980	3 304	3 153	5 436	7 375	6 340	8 244	5 500	9 191	4 135	4 249	3 518
Jordan							4 319	5 434	6 066	6 261	5 951	5 666
Kazakhstan							5 031	5 095	5 706	4 702	4 314	4 970
Kyrgyzstan										4 791	4 613	4 195
Latvia	3 240	1 826	2 059	3 851	3 920	4 026	4 136	4 481	4 368	3 770	4 172	3 205
Liechtenstein	286	153	170	316	274	285	309	278	300	315	289	307
Lithuania							4 255	3 675	4 535	4 151	4 127	4 041
Macao-China				970	1 189	1 053	3 944	3 424	4 377	4 804	5 506	4 099
Macedonia	3 629	2 149	2 387				4 102	3 570	4 039			
Montenegro										4 399	3 986	3 680
Panama										2 748	3 370	3 698
Peru	4 020	2 067	1 218							5 263	2 972	3 223
Qatar							5 030	4 814	5 548	9 033	8 612	7 285
Romania	3 863	2 351	2 349				3 668	3 681	4 805	4 722	3 642	4 388
Russian Federation	5 771	3 232	3 252	4 888	4 667	5 178	4 091	4 711	5 354	4 629	4 997	4 356
Serbia				3 977	3 424	3 247	4 216	3 617	4 578	4 871	5 373	5 317
Shanghai-China										4 525	4 845	4 234
Singapore										4 924	3 749	4 277
Chinese Taipei							5 535	7 448	8 270	5 157	5 581	4 971
Thailand	4 726	2 406	2 698	3 073	4 177	3 934	5 193	4 898	5 721	5 446	6 098	4 881
Trinidad and Tobago					3 181	4 497	4 284	4 225	3 890	4 526	4 688	3 548
Tunisia				4 344	5 308	5 608	4 175	4 049	4 293	4 573	4 494	4 499
Uruguay										5 271	4 326	4 160



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Table 11.8 Design effect 2 by country, by domain and cycle

	PISA 2000			PISA 2003			PISA 2006			PISA 2009		
	Reading	Mathematics	Science									
OECD												
Australia	4.77	2.89	3.22	4.92	5.75	4.69	5.89	8.32	6.44	7.40	8.15	8.30
Austria	2.98	1.93	1.95	5.58	4.97	5.29	6.41	6.01	7.08	5.01	4.49	6.19
Belgium	6.96	4.54	5.39	4.33	3.59	3.18	6.31	6.68	5.20	3.93	3.26	3.90
Canada	7.41	4.05	4.70	7.29	8.08	6.34	11.21	11.04	9.33	5.61	5.01	6.05
Chile	6.96	3.13	2.59				10.50	11.22	10.77	6.28	7.25	6.39
Czech Republic	3.04	2.46	1.90	6.15	7.13	4.51	7.59	6.15	6.99	4.84	5.04	5.17
Denmark	2.26	1.53	1.67	3.09	3.07	2.78	4.93	3.63	4.32	3.27	4.86	3.28
Estonia							5.37	5.31	3.86	3.90	4.07	3.73
Finland	3.55	1.54	1.80	2.06	2.30	2.04	2.94	2.37	2.13	3.76	3.97	3.50
France	3.70	1.99	2.01	2.83	2.87	2.48	6.83	4.32	5.05	4.41	3.69	5.02
Germany	2.20	1.62	1.33	4.29	4.81	4.42	7.09	6.54	6.51	3.63	3.51	3.62
Greece	10.29	5.60	6.51	4.70	7.24	3.41	6.98	4.61	4.28	7.81	7.74	6.04
Hungary	8.41	4.53	4.42	3.08	3.66	2.66	4.36	3.56	3.77	5.69	6.04	5.79
Iceland	0.75	1.06	1.10	0.74	0.78	0.75	0.94	1.02	0.97	0.76	0.75	0.78
Ireland	4.16	2.09	2.52	3.16	2.87	2.59	5.16	4.38	4.02	3.77	3.39	3.86
Israel	18.44	10.96	9.86				6.00	6.12	4.85	4.86	5.38	3.81
Italy	4.35	2.21	2.54	5.59	6.77	8.14	9.10	9.59	8.83	6.74	10.17	6.86
Japan	17.53	10.60	9.12	4.97	6.87	6.16	6.46	7.78	6.45	6.85	7.01	6.42
Korea	5.33	2.65	2.52	6.14	5.47	6.07	6.56	7.77	6.10	7.52	9.57	6.03
Luxembourg	0.77	0.81	0.98	0.64	0.43	0.67	0.62	0.53	0.51	0.55	0.55	0.53
Mexico	5.88	3.60	3.66	29.59	34.24	8.22	18.09	12.83	20.21	14.66	19.95	12.17
Netherlands	3.39	2.17	2.32	3.51	4.21	3.15	3.28	3.50	3.40	14.05	12.60	12.50
New Zealand	2.35	1.82	1.12	2.27	1.97	2.00	3.33	2.67	2.92	2.24	2.43	2.54
Norway	2.85	1.70	1.81	2.36	2.63	2.74	3.89	3.45	4.65	3.10	3.27	3.24
Poland	6.29	5.20	3.99	3.37	3.00	3.30	4.02	3.46	3.47	3.75	4.20	2.93
Portugal	8.30	4.63	4.98	6.75	6.84	5.56	5.20	4.35	4.84	7.40	5.54	6.51
Slovak Republic				8.09	8.32	9.47	3.54	2.95	3.23	3.31	4.54	4.04
Slovenia							0.71	0.73	0.79	0.74	0.85	0.79
Spain	5.44	3.96	3.19	4.38	5.87	5.31	9.34	6.21	8.21	12.56	8.32	11.09
Sweden	2.10	1.53	1.57	2.54	3.18	2.11	3.29	3.01	2.57	3.62	3.76	3.22
Switzerland	10.04	5.49	5.18	8.23	7.80	8.26	9.88	8.86	10.88	7.02	7.22	7.97
Turkey				14.39	16.15	14.55	8.11	10.30	10.19	7.97	10.58	8.64
United Kingdom	5.55	3.31	3.07	4.46	5.25	4.81	5.31	6.41	4.27	6.39	7.85	6.65
United States	15.82	11.77	9.91	3.73	3.85	3.80	9.83	8.61	6.81	7.59	6.54	
Partners												
Albania	5.10	1.97	1.94							7.28	6.41	7.95
Argentina	27.72	11.50	10.32				11.18	12.41	14.05	8.00	8.63	9.32
Azerbaijan							6.48	9.03	10.49	6.77	7.66	5.75
Brazil	5.32	3.14	2.16	5.49	8.54	4.65	7.75	7.79	6.50	15.32	13.24	12.55
Bulgaria	9.54	6.78	4.35				14.20	13.56	12.70	13.09	15.22	13.15
Colombia							7.34	7.48	4.87	13.34	9.85	12.60
Croatia							4.43	3.75	3.79	5.16	5.19	4.90
Dubai (UAE)										0.62	0.62	0.65
Hong Kong-China	5.10	2.69	2.73	7.88	6.48	7.74	3.75	3.36	3.27	2.84	3.77	4.74
Indonesia	15.08	9.47	8.71	10.69	17.38	14.12	51.68	27.19	61.43	13.06	11.90	10.64
Jordan							5.21	8.47	6.05	8.31	11.99	8.93
Kazakhstan										5.36	5.72	6.50
Kyrgyzstan							5.83	7.83	6.98	5.00	5.83	4.36
Latvia	8.62	3.40	6.80	6.34	6.90	7.08	6.99	5.99	5.42	5.15	6.26	4.95
Liechtenstein	0.52	0.81	0.95	0.50	0.47	0.50	0.52	0.57	0.54	0.36	0.62	0.47
Lithuania							4.15	3.90	4.25	3.18	3.64	4.79
Macao-China				1.01	1.31	1.25	0.81	0.82	0.80	0.66	0.63	0.75
Macedonia	1.55	1.60	1.53				0.75	0.92	0.72	1.50	2.28	1.99
Montenegro										11.92	14.28	15.02
Panama												
Peru	8.47	3.46	2.41							8.50	5.87	4.93
Qatar							0.61	0.61	0.58	0.40	0.44	0.54
Romania	4.45	3.20	2.98				9.57	9.25	12.87	9.76	6.74	7.97
Russian Federation	11.79	8.90	7.42	8.70	9.66	8.92	8.80	8.79	8.97	6.40	7.51	5.84
Serbia				7.59	6.73	5.80	6.00	5.30	5.82	4.11	5.58	4.21
Shanghai-China										4.04	3.63	3.37
Singapore										0.58	0.71	0.73
Chinese Taipei							8.86	11.79	11.80	4.67	5.84	4.59
Thailand	8.44	4.57	4.27	3.97	5.59	4.34	5.21	4.03	4.41	7.35	10.16	6.83
Trinidad and Tobago				2.74	4.30	3.68	7.21	7.21	5.83	0.56	0.59	0.55
Tunisia				3.47	5.76	3.95	3.35	2.79	3.64	5.23	6.66	4.90
Uruguay										3.63	3.47	2.96

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Table 11.9 Effective sample size 2 by country, by domain and cycle

	PISA 2000			PISA 2003			PISA 2006			PISA 2009		
	Reading	Mathematics	Science									
OECD												
Australia	1 085	991	889	2 549	2 184	2 675	2 406	1 703	2 201	1 926	1 748	1 716
Austria	1 590	1 370	1 370	824	925	868	769	820	696	1 315	1 468	1 064
Belgium	958	834	690	2 031	2 452	2 767	1 404	1 326	1 705	2 165	2 611	2 179
Canada	4 009	4 072	3 506	3 834	3 458	4 407	2 020	2 052	2 428	4 136	4 631	3 836
Chile	702	870	1 047				498	467	486	902	782	887
Czech Republic	1 766	1 246	1 611	1 027	887	1 400	781	964	848	1 253	1 204	1 173
Denmark	1 875	1 556	1 405	1 367	1 374	1 520	919	1 249	1 049	1 810	1 220	1 806
Estonia							907	917	1 259	1 211	1 162	1 266
Finland	1 370	1 751	1 510	2 820	2 519	2 844	1 606	1 991	2 213	1 544	1 465	1 661
France	1 262	1 305	1 290	1 522	1 498	1 733	690	1 093	934	975	1 164	856
Germany	2 309	1 747	2 142	1 087	969	1 053	690	748	752	1 371	1 419	1 374
Greece	454	466	398	985	639	1 356	698	1 058	1 138	636	642	823
Hungary	581	618	633	1 549	1 301	1 791	1 031	1 261	1 192	810	762	796
Iceland	4 470	1 768	1 684	4 538	4 268	4 470	4 028	3 717	3 917	4 792	4 846	4 690
Ireland	927	1 016	847	1 228	1 352	1 498	888	1 046	1 140	1 046	1 162	1 019
Israel	244	227	255				764	749	944	1 185	1 072	1 513
Italy	1 147	1 250	1 087	2 082	1 720	1 430	2 394	2 271	2 465	4 584	3 038	4 502
Japan	300	276	320	947	685	764	921	765	923	889	868	948
Korea	935	1 047	1 095	887	994	897	789	666	849	664	521	827
Luxembourg	4 603	2 415	1 983	6 122	9 061	5 890	7 380	8 698	8 992	8 368	8 390	8 694
Mexico	783	714	696	1 013	876	3 650	1 712	2 415	1 533	2 609	1 917	3 142
Netherlands	739	636	601	1 137	949	1 267	1 484	1 393	1 431	339	378	381
New Zealand	1 560	1 128	1 811	1 991	2 287	2 260	1 447	1 805	1 654	2 074	1 912	1 825
Norway	1 457	1 357	1 279	1 723	1 545	1 486	1 205	1 359	1 008	1 503	1 427	1 437
Poland	581	380	513	1 302	1 462	1 328	1 381	1 603	1 600	1 311	1 172	1 680
Portugal	553	550	513	683	673	829	982	1 173	1 056	851	1 137	968
Slovak Republic				908	883	776	1 338	1 605	1 465	1 378	1 003	1 127
Slovenia							9 244	9 015	8 373	8 351	7 215	7 799
Spain	1 143	866	1 083	2 463	1 838	2 031	2 100	3 158	2 388	2 062	3 111	2 335
Sweden	2 106	1 609	1 558	1 821	1 454	2 191	1 350	1 475	1 730	1 262	1 215	1 419
Switzerland	607	618	656	1 023	1 080	1 020	1 234	1 376	1 121	1 682	1 636	1 481
Turkey				337	301	334	609	480	485	627	472	578
United Kingdom	1 682	1 570	1 687	2 138	1 817	1 984	2 476	2 050	3 079	1 906	1 551	1 831
United States	243	181	215	1 462	1 418	1 437		571	652	768	689	800
Partners												
Albania	977	1 410	1 427							632	717	578
Argentina	144	194	214				388	350	309	596	554	512
Azerbaijan							800	574	494	693	612	816
Brazil	920	864	1 253	810	521	956	1 200	1 193	1 431	1 314	1 520	1 604
Bulgaria	488	386	586				317	332	354	344	296	343
Colombia							610	598	920	594	804	628
Croatia							1 177	1 389	1 374	967	962	1 019
Dubai (UAE)										9 023	9 005	8 610
Hong Kong-China	863	907	893	568	691	578	1 237	1 384	1 422	1 703	1 284	1 021
Indonesia	489	432	468	1 007	619	762	206	392	173	393	432	482
Jordan							1 249	769	1 076	781	541	726
Kazakhstan										1 010	946	833
Kyrgyzstan							1 012	754	846	997	855	1 145
Latvia	451	632	317	730	671	654	675	787	870	873	719	910
Liechtenstein	600	216	185	664	700	666	649	593	630	920	532	697
Lithuania							1 144	1 217	1 115	1 426	1 243	946
Macao-China				1 239	956	1 002	5 857	5 820	5 947	9 031	9 394	7 906
Macedonia	2 909	1 588	1 650									
Montenegro							5 938	4 837	6 226	3 213	2 112	2 422
Panama										333	278	264
Peru	523	711	1 022							704	1 020	1 214
Qatar							10 254	10 257	10 791	22 892	20 465	16 870
Romania	1 086	839	904				535	553	398	489	709	599
Russian Federation	568	418	501	687	618	670	659	660	647	829	707	909
Serbia				580	654	759	800	906	824	1 344	989	1 312
Shanghai-China										1 265	1 408	1 519
Singapore										9 141	7 409	7 199
Chinese Taipei							995	748	747	1 249	998	1 269
Thailand	633	648	694	1 320	937	1 205	1 189	1 537	1 403	847	613	912
Trinidad and Tobago				1 725	1 097	1 282	643	643	795	8 515	8 121	8 694
Tunisia				1 683	1 012	1 478	1 444	1 734	1 329	1 643	1 719	2 014
Uruguay												



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Table 11.10 Design effect 3 by country, by domain and cycle

	PISA 2000			PISA 2003			PISA 2006			PISA 2009		
	Reading	Mathematics	Science									
OECD												
Australia	5.90	3.81	3.67	5.77	6.25	5.19	6.69	9.08	7.09	7.88	10.05	8.80
Austria	3.10	1.93	2.01	6.02	5.52	5.69	6.91	6.96	7.81	5.57	4.92	6.61
Belgium	7.31	4.98	5.53	4.73	3.75	4.20	6.70	6.84	5.44	4.38	3.76	4.65
Canada	7.97	4.42	5.06	10.39	11.67	10.75	14.24	11.82	10.40	6.14	7.31	7.31
Chile	7.66	3.86	3.20				12.08	14.09	11.53	7.81	8.12	7.16
Czech Republic	3.18	2.51	1.97	7.96	8.42	6.54	8.27	6.88	7.34	5.72	5.48	5.56
Denmark	2.36	1.65	1.70	3.90	3.57	3.30	5.58	4.12	4.88	3.53	5.21	4.00
Estonia							5.69	5.60	4.28	4.52	4.57	4.48
Finland	3.90	1.68	1.99	2.22	2.63	2.33	3.17	3.19	2.39	3.90	4.00	3.84
France	4.02	2.19	2.26	3.12	3.09	2.87	7.15	4.99	5.14	4.53	3.95	5.24
Germany	2.36	1.65	1.41	4.44	4.86	4.84	7.52	7.31	6.96	3.83	4.02	3.79
Greece	12.04	6.68	6.60	6.60	7.89	5.72	7.48	4.94	5.59	9.94	9.14	9.07
Hungary	8.64	4.66	4.58	3.32	4.19	3.41	5.18	4.24	4.04	5.70	6.40	6.02
Iceland	0.73	1.08	1.11	0.70	0.77	0.74	0.90	1.03	0.96	0.75	0.72	0.77
Ireland	4.50	2.17	2.55	3.44	3.08	2.99	6.41	5.08	4.92	3.82	3.45	4.30
Israel	26.61	12.44	12.82				6.63	7.28	5.02	5.86	5.65	4.62
Italy	4.90	2.59	2.62	9.72	11.24	9.59	10.64	12.07	9.62	8.07	12.09	9.89
Japan	19.28	11.57	10.50	6.20	7.42	6.66	7.39	7.99	6.71	7.20	7.53	7.02
Korea	5.89	2.84	2.85	7.39	6.47	6.63	9.18	8.44	7.01	9.26	10.05	8.28
Luxembourg	0.73	0.79	0.98	0.51	0.43	0.58	0.54	0.46	0.48	0.45	0.45	0.43
Mexico	6.69	4.06	4.15	54.56	53.89	43.63	30.91	34.61	34.30	19.99	20.44	19.81
Netherlands	3.52	2.27	2.35	4.23	4.48	3.78	4.10	3.96	3.83	15.91	13.44	14.91
New Zealand	2.40	1.93	1.12	2.39	2.17	2.15	3.73	2.98	3.00	2.34	2.58	2.63
Norway	2.97	1.87	1.85	2.72	2.68	2.98	4.19	3.77	4.86	3.53	3.55	3.72
Poland	7.12	5.56	5.28	3.77	3.25	3.39	4.24	4.14	3.68	4.08	4.86	3.50
Portugal	9.72	4.98	5.11	7.36	6.94	6.19	6.36	5.51	5.72	7.80	6.25	7.43
Slovak Republic				8.33	9.31	9.66	3.87	3.79	3.52	3.53	4.65	4.36
Slovenia							0.67	0.67	0.77	0.72	0.82	0.76
Spain	6.18	4.04	3.27	7.19	7.64	6.96	12.06	12.34	14.82	13.70	13.33	13.97
Sweden	2.32	1.59	1.64	2.80	3.31	2.59	4.79	3.14	2.72	3.82	4.20	3.34
Switzerland	10.52	6.37	6.40	9.85	9.68	9.69	12.60	12.33	12.22	7.92	12.24	9.90
Turkey				17.67	19.84	18.03	9.88	13.33	10.49	9.06	11.23	9.77
United Kingdom	5.97	3.70	3.61	6.08	6.34	5.56	6.23	7.45	5.63	6.87	9.19	7.72
United States	17.29	12.79	11.01	5.05	4.87	4.69		11.11	8.87	7.39	8.03	7.18
Partners												
Albania	5.38	2.14	2.27							7.48	8.45	8.90
Argentina	32.64	13.32	13.21				14.17	16.20	15.54	8.65	9.08	9.57
Azerbaijan							9.66	11.22	12.47	8.77	8.61	7.60
Brazil	6.14	3.68	2.90	7.17	10.23	7.83	11.80	9.23	8.66	16.84	17.10	16.53
Bulgaria	10.63	6.97	5.49				15.44	16.32	14.58	15.49	15.75	13.83
Colombia							9.60	8.16	6.63	14.69	14.14	15.57
Croatia							5.03	4.08	4.12	5.33	5.95	5.44
Dubai (UAE)										0.61	0.60	0.60
Hong Kong-China	5.31	2.85	2.93	8.39	8.76	8.99	3.99	3.66	3.35	2.99	3.91	4.78
Indonesia	21.83	11.49	10.96	20.17	24.89	23.28	66.45	51.69	71.00	15.97	14.17	15.08
Jordan							7.35	9.94	6.42	8.57	12.97	10.08
Kazakhstan										6.01	6.92	6.99
Kyrgyzstan							6.67	8.91	7.19	5.16	6.22	4.99
Latvia	10.16	3.83	7.08	7.42	7.96	7.98	7.84	6.26	5.78	5.96	6.68	6.54
Liechtenstein	0.48	0.78	0.95	0.47	0.36	0.42	0.48	0.48	0.48	0.33	0.56	0.43
Lithuania							4.51	4.74	4.40	3.37	3.90	5.24
Macao-China				1.01	1.32	1.29	0.77	0.75	0.78	0.58	0.60	0.64
Macedonia	1.68	1.71	1.56									
Montenegro							0.73	0.90	0.69	1.55	2.55	2.30
Panama										16.78	16.64	16.04
Peru	9.24	3.93	3.84							9.53	10.81	8.30
Qatar							0.52	0.49	0.53	0.39	0.41	0.42
Romania	5.31	3.51	3.27				12.96	12.47	13.65	9.87	8.53	8.58
Russian Federation	13.53	10.09	8.34	10.41	12.09	10.14	12.06	10.59	9.63	7.19	7.92	6.90
Serbia				8.30	8.38	7.52	6.69	6.70	6.06	4.53	5.71	4.33
Shanghai-China										4.44	3.78	3.86
Singapore										0.55	0.60	0.67
Chinese Taipei							13.51	13.77	12.52	5.15	6.06	5.22
Thailand	9.40	5.39	4.60	6.06	6.75	5.45	6.02	4.83	4.69	8.26	10.35	8.43
Trinidad and Tobago				3.58	4.47	3.96	7.82	8.41	5.96	0.55	0.45	0.49
Tunisia				4.31	6.24	4.07	3.73	3.14	3.98	5.58	7.24	5.30
Uruguay										3.97	4.40	3.80

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Table 11.11 Effective sample size 3 by country, by domain and cycle

	PISA 2000			PISA 2003			PISA 2006			PISA 2009		
	Reading	Mathematics	Science									
OECD												
Australia	877	751	779	2 176	2 007	2 417	2 118	1 560	1 999	1 808	1 418	1 620
Austria	1 531	1 365	1 327	764	833	808	713	708	631	1 183	1 339	998
Belgium	912	761	674	1 861	2 349	2 093	1 323	1 295	1 627	1 942	2 261	1 830
Canada	3 726	3 726	3 260	2 690	2 396	2 601	1 591	1 916	2 176	3 780	3 174	3 175
Chile	638	706	847				433	372	454	726	698	792
Czech Republic	1 688	1 221	1 554	794	751	966	717	862	808	1 060	1 106	1 090
Denmark	1 796	1 440	1 383	1 081	1 182	1 279	812	1 099	929	1 677	1 138	1 480
Estonia							855	869	1 137	1 045	1 035	1 056
Finland	1 246	1 610	1 363	2 609	2 204	2 492	1 486	1 477	1 973	1 489	1 453	1 512
France	1 164	1 184	1 148	1 380	1 393	1 498	659	946	918	948	1 089	820
Germany	2 152	1 711	2 031	1 050	959	963	651	669	702	1 299	1 239	1 314
Greece	388	390	393	701	586	810	652	986	872	500	544	548
Hungary	566	601	612	1 437	1 138	1 395	866	1 058	1 112	808	720	764
Iceland	4 633	1 741	1 679	4 774	4 338	4 552	4 191	3 677	3 933	4 843	5 063	4 724
Ireland	856	979	838	1 128	1 258	1 296	715	903	931	1 031	1 142	915
Israel	169	200	196				692	630	912	984	1 020	1 248
Italy	1 018	1 066	1 054	1 197	1 035	1 213	2 046	1 804	2 263	3 828	2 557	3 124
Japan	273	253	277	759	635	707	805	745	887	846	809	867
Korea	846	974	968	737	842	821	564	613	738	539	496	603
Luxembourg	4 838	2 480	1 988	7 655	9 220	6 739	8 461	9 884	9 610	10 201	10 290	10 632
Mexico	688	633	613	549	556	687	1 002	895	903	1 913	1 871	1 931
Netherlands	711	610	593	944	891	1 057	1 187	1 229	1 273	299	354	319
New Zealand	1 531	1 060	1 805	1 886	2 077	2 094	1 293	1 619	1 609	1 980	1 802	1 768
Norway	1 398	1 234	1 246	1 495	1 517	1 366	1 119	1 244	965	1 320	1 313	1 254
Poland	513	356	387	1 164	1 349	1 293	1 309	1 339	1 507	1 206	1 011	1 406
Portugal	472	511	499	626	664	745	803	928	893	808	1 008	848
Slovak Republic				882	789	761	1 223	1 249	1 346	1 292	979	1 046
Slovenia							9 872	9 837	8 541	8 585	7 461	8 150
Spain	1 005	848	1 057	1 502	1 413	1 550	1 625	1 589	1 323	1 890	1 942	1 853
Sweden	1 903	1 546	1 488	1 653	1 396	1 788	929	1 415	1 631	1 197	1 087	1 369
Switzerland	580	533	531	855	870	869	968	989	997	1 491	965	1 193
Turkey				275	245	269	500	371	471	551	445	511
United Kingdom	1 564	1 406	1 433	1 567	1 504	1 716	2 112	1 766	2 337	1 772	1 325	1 577
United States	222	167	193	1 081	1 120	1 164			505	633	709	651
Partners												
Albania	925	1 301	1 224							615	544	517
Argentina	122	167	167				306	268	279	552	526	499
Azerbaijan							537	462	416	535	545	617
Brazil	797	739	935	621	435	569	788	1 007	1 074	1 195	1 177	1 218
Bulgaria	438	375	464				291	276	308	291	286	326
Colombia							467	549	675	539	560	509
Croatia							1 037	1 278	1 265	938	839	918
Dubai (UAE)										9 205	9 365	9 347
Hong Kong-China	830	855	831	534	511	498	1 164	1 268	1 389	1 618	1 237	1 011
Indonesia	337	356	372	533	432	462	160	206	150	322	362	341
Jordan							886	655	1 014	757	500	644
Kazakhstan										900	782	775
Kyrgyzstan							885	662	821	966	801	999
Latvia	383	562	305	624	581	580	602	754	817	755	674	688
Liechtenstein	658	224	185	699	911	798	713	710	709	999	582	758
Lithuania							1 052	1 001	1 077	1 342	1 161	863
Macao-China				1 236	945	967	6 151	6 374	6 079	10 305	9 857	9 284
Macedonia	2 679	1 485	1 617				6 114	4 943	6 492	3 112	1 890	2 098
Montenegro										237	239	247
Panama										628	554	721
Peru	480	626	640									
Qatar							12 151	12 697	11 900	23 068	21 955	21 389
Romania	910	765	824				395	410	375	484	560	556
Russian Federation	495	369	446	574	494	589	481	547	602	738	671	770
Serbia				530	526	586	718	716	792	1 220	967	1 275
Shanghai-China										1 152	1 354	1 325
Singapore										9 656	8 867	7 870
Chinese Taipei							653	640	704	1 133	963	1 118
Thailand	568	549	645	865	775	961	1 029	1 282	1 319	754	601	738
Trinidad and Tobago				1 320	1 057	1 193	593	552	779	8 644	10 722	9 800
Tunisia				1 353	935	1 435	1 299	1 541	1 217	888	685	935
Uruguay										1 502	1 355	1 566



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Table 11.12 Design effect 4 by country, by domain and cycle

	PISA 2000			PISA 2003			PISA 2006			PISA 2009		
	Reading	Mathematics	Science									
OECD												
Australia	1.05	1.13	1.06	1.04	1.02	1.03	1.02	1.01	1.02	1.01	1.03	1.01
Austria	1.02	1.00	1.03	1.02	1.03	1.02	1.01	1.03	1.02	1.03	1.03	1.01
Belgium	1.01	1.03	1.01	1.03	1.02	1.11	1.01	1.00	1.01	1.04	1.06	1.06
Canada	1.01	1.03	1.02	1.05	1.04	1.08	1.02	1.01	1.01	1.02	1.08	1.03
Chile	1.02	1.09	1.12				1.01	1.02	1.01	1.04	1.02	1.02
Czech Republic	1.02	1.01	1.04	1.04	1.03	1.09	1.01	1.02	1.01	1.04	1.02	1.02
Denmark	1.03	1.14	1.02	1.10	1.07	1.09	1.03	1.05	1.03	1.03	1.02	1.08
Estonia							1.01	1.01	1.03	1.05	1.04	1.06
Finland	1.04	1.15	1.12	1.07	1.10	1.12	1.04	1.19	1.10	1.01	1.00	1.04
France	1.03	1.09	1.11	1.05	1.04	1.09	1.01	1.04	1.00	1.01	1.02	1.01
Germany	1.06	1.03	1.16	1.01	1.00	1.03	1.01	1.02	1.01	1.02	1.05	1.02
Greece	1.02	1.04	1.00	1.08	1.01	1.17	1.01	1.02	1.07	1.03	1.02	1.07
Hungary	1.00	1.01	1.01	1.03	1.05	1.13	1.05	1.06	1.02	1.00	1.01	1.01
Iceland	1.15	1.23	1.03	1.20	1.08	1.07	1.69	1.55	1.12	1.04	1.18	1.03
Ireland	1.02	1.03	1.01	1.04	1.04	1.08	1.05	1.04	1.06	1.01	1.01	1.04
Israel	1.02	1.01	1.03				1.02	1.03	1.01	1.04	1.01	1.06
Italy	1.03	1.12	1.02	1.09	1.07	1.02	1.02	1.02	1.01	1.03	1.02	1.05
Japan	1.01	1.01	1.02	1.05	1.01	1.01	1.02	1.00	1.01	1.01	1.01	1.02
Korea	1.02	1.04	1.08	1.03	1.03	1.02	1.05	1.01	1.03	1.03	1.01	1.05
Luxembourg	1.22	1.14	1.15	1.71	1.03	1.44	1.39	1.29	1.14	1.49	1.51	1.48
Mexico	1.02	1.04	1.04	1.02	1.01	1.11	1.02	1.05	1.02	1.02	1.00	1.03
Netherlands	1.02	1.04	1.01	1.07	1.02	1.08	1.09	1.05	1.05	1.01	1.01	1.01
New Zealand	1.01	1.07	1.02	1.04	1.09	1.07	1.05	1.06	1.01	1.04	1.04	1.02
Norway	1.02	1.13	1.03	1.10	1.01	1.05	1.02	1.03	1.01	1.06	1.04	1.06
Poland	1.02	1.02	1.08	1.05	1.04	1.01	1.02	1.07	1.02	1.03	1.04	1.08
Portugal	1.02	1.02	1.01	1.01	1.00	1.02	1.04	1.06	1.04	1.01	1.03	1.02
Slovak Republic				1.00	1.01	1.00	1.03	1.11	1.04	1.03	1.01	1.02
Slovenia							1.24	1.34	1.10	1.11	1.23	1.22
Spain	1.03	1.01	1.01	1.12	1.05	1.06	1.03	1.10	1.06	1.01	1.05	1.02
Sweden	1.09	1.07	1.08	1.06	1.02	1.17	1.14	1.02	1.04	1.02	1.04	1.02
Switzerland	1.00	1.03	1.05	1.02	1.03	1.02	1.02	1.04	1.01	1.02	1.07	1.03
Turkey				1.01	1.01	1.01	1.03	1.02	1.00	1.02	1.01	1.02
United Kingdom	1.02	1.05	1.07	1.08	1.04	1.04	1.03	1.03	1.07	1.01	1.02	1.02
United States	1.01	1.01	1.01	1.10	1.07	1.07	1.01	1.00	1.01	1.01	1.01	1.02
Partners												
Albania	1.01	1.08	1.15							1.00	1.04	1.02
Argentina	1.01	1.01	1.02				1.02	1.02	1.01	1.01	1.01	1.00
Azerbaijan							1.06	1.02	1.02	1.04	1.02	1.05
Brazil	1.03	1.07	1.22	1.05	1.02	1.11	1.05	1.02	1.05	1.01	1.02	1.02
Bulgaria	1.01	1.00	1.06				1.01	1.01	1.01	1.01	1.00	1.00
Colombia							1.04	1.01	1.07	1.01	1.03	1.02
Croatia							1.03	1.03	1.03	1.01	1.03	1.03
Dubai (UAE)										1.05	1.11	1.25
Hong Kong-China	1.01	1.03	1.04	1.01	1.05	1.02	1.02	1.04	1.01	1.03	1.01	1.00
Indonesia	1.02	1.02	1.03	1.05	1.02	1.03	1.00	1.02	1.00	1.02	1.01	1.03
Jordan							1.07	1.02	1.01	1.00	1.01	1.01
Kazakhstan										1.03	1.04	1.01
Kyrgyzstan							1.03	1.02	1.00	1.01	1.01	1.04
Latvia	1.02	1.05	1.01	1.03	1.02	1.02	1.02	1.01	1.01	1.03	1.01	1.06
Liechtenstein	1.20	1.19	1.04	1.11	1.58	1.40	1.21	1.47	1.28	1.14	1.25	1.17
Lithuania							1.03	1.06	1.01	1.03	1.02	1.02
Macao-China				1.29	1.04	1.15	1.27	1.53	1.11	1.42	1.14	1.71
Macedonia	1.15	1.11	1.04									
Montenegro							1.12	1.28	1.15	1.07	1.09	1.14
Panama										1.03	1.01	1.00
Peru	1.01	1.05	1.27							1.01	1.09	1.10
Qatar							1.48	1.62	1.25	1.01	1.13	1.58
Romania	1.05	1.04	1.05				1.03	1.03	1.00	1.00	1.04	1.01
Russian Federation	1.01	1.01	1.02	1.02	1.02	1.02	1.03	1.02	1.01	1.02	1.01	1.03
Serbia				1.01	1.03	1.05	1.02	1.05	1.01	1.03	1.00	1.01
Shanghai-China										1.03	1.01	1.05
Singapore										1.14	1.69	1.35
Chinese Taipei							1.04	1.01	1.01	1.03	1.01	1.03
Thailand	1.01	1.04	1.02	1.12	1.04	1.06	1.03	1.05	1.02	1.02	1.00	1.03
Trinidad and Tobago				1.14	1.01	1.03	1.01	1.02	1.00	1.03	1.78	1.28
Tunisia				1.08	1.02	1.01	1.04	1.06	1.03	1.02	1.01	1.02
Uruguay										1.03	1.09	1.11

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Table 11.13 Effective sample size 4 by country, by domain and cycle

	PISA 2000			PISA 2003			PISA 2006			PISA 2009		
	Reading	Mathematics	Science									
OECD	4 926	2 534	2 709	12 098	12 339	12 231	13 831	14 010	13 934	14 115	13 884	14 143
Australia	4 657	2 630	2 582	4 525	4 485	4 524	4 862	4 796	4 852	6 429	6 428	6 512
Belgium	6 617	3 692	3 702	8 579	8 655	7 911	8 762	8 821	8 762	8 212	8 024	8 055
Canada	29 364	16 041	16 181	26 687	26 790	25 958	22 183	22 498	22 367	22 782	21 517	22 441
Chile	4 815	2 499	2 420				5 162	5 131	5 198	5 466	5 573	5 559
Czech Republic	5 251	3 025	2 946	6 053	6 166	5 806	5 859	5 812	5 885	5 829	5 944	5 962
Denmark	4 097	2 090	2 292	3 833	3 952	3 872	4 402	4 333	4 380	5 739	5 822	5 489
Estonia							4 802	4 806	4 705	4 514	4 564	4 456
Finland	4 697	2 352	2 414	5 412	5 287	5 177	4 540	3 964	4 301	5 736	5 794	5 609
France	4 542	2 373	2 337	4 090	4 143	3 938	4 680	4 532	4 696	4 263	4 197	4 254
Germany	4 800	2 738	2 466	4 612	4 648	4 546	4 845	4 799	4 833	4 881	4 740	4 897
Greece	4 600	2 516	2 587	4 292	4 567	3 962	4 819	4 783	4 549	4 817	4 858	4 660
Hungary	4 870	2 777	2 772	4 604	4 550	4 205	4 286	4 224	4 383	4 602	4 555	4 567
Iceland	2 936	1 527	1 809	2 793	3 113	3 121	2 246	2 444	3 372	3 491	3 086	3 529
Ireland	3 762	2 059	2 119	3 739	3 741	3 577	4 380	4 406	4 323	3 917	3 909	3 801
Israel	4 420	2 454	2 450				4 499	4 446	4 544	5 517	5 698	5 423
Italy	4 822	2 464	2 712	10 650	10 887	11 397	21 390	21 264	21 547	30 037	30 381	29 369
Japan	5 227	2 899	2 867	4 483	4 649	4 640	5 818	5 929	5 910	6 038	6 019	5 994
Korea	4 875	2 656	2 561	5 270	5 264	5 354	4 923	5 116	5 047	4 849	4 962	4 734
Luxembourg	2 893	1 713	1 691	2 301	3 804	2 730	3 291	3 542	3 999	3 099	3 070	3 126
Mexico	4 489	2 460	2 439	29 508	29 656	26 950	30 236	29 401	30 322	37 516	38 202	36 973
Netherlands	2 463	1 334	1 382	3 738	3 917	3 706	4 478	4 652	4 657	4 718	4 735	4 694
New Zealand	3 617	1 908	1 980	4 330	4 120	4 200	4 613	4 542	4 756	4 479	4 463	4 551
Norway	4 058	2 042	2 237	3 703	4 019	3 883	4 579	4 535	4 638	4 404	4 501	4 410
Poland	3 575	1 947	1 888	4 194	4 220	4 334	5 452	5 199	5 419	4 778	4 714	4 533
Portugal	4 495	2 497	2 536	4 542	4 597	4 508	4 897	4 809	4 911	6 248	6 144	6 159
Slovak Republic				7 317	7 240	7 329	4 576	4 247	4 565	4 435	4 524	4 450
Slovenia							5 322	4 915	6 022	5 557	4 993	5 052
Spain	6 050	3 403	3 420	9 673	10 301	10 228	19 085	17 896	18 461	25 702	24 623	25 368
Sweden	4 059	2 295	2 265	4 362	4 541	3 966	3 906	4 355	4 287	4 478	4 400	4 495
Switzerland	6 070	3 295	3 248	8 230	8 186	8 251	11 903	11 770	12 058	11 593	11 081	11 491
Turkey				4 789	4 796	4 787	4 821	4 824	4 927	4 910	4 966	4 921
United Kingdom	9 198	4 968	4 826	8 852	9 164	9 208	12 717	12 823	12 248	12 023	11 925	11 887
United States	3 824	2 119	2 105	4 980	5 081	5 109		5 539	5 590	5 164	5 189	5 151
Partners												
Albania	4 916	2 577	2 403							4 576	4 399	4 526
Argentina	3 961	2 201	2 160				4 251	4 252	4 307	4 723	4 743	4 759
Azerbaijan							4 890	5 061	5 099	4 512	4 615	4 462
Brazil	4 746	2 544	2 220	4 232	4 357	4 005	8 844	9 086	8 891	20 001	19 763	19 715
Bulgaria	4 601	2 603	2 397				4 471	4 438	4 449	4 450	4 496	4 489
Colombia							4 318	4 421	4 189	7 863	7 658	7 793
Croatia							5 038	5 065	5 069	4 958	4 846	4 870
Dubai (UAE)										5 334	5 077	4 505
Hong Kong-China	4 365	2 358	2 343	4 439	4 275	4 387	4 548	4 485	4 597	4 709	4 773	4 825
Indonesia	7 210	4 006	3 970	10 262	10 566	10 447	10 600	10 457	10 623	5 059	5 061	4 984
Jordan							6 088	6 382	6 436	6 459	6 441	6 394
Kazakhstan										5 279	5 220	5 344
Kyrgyzstan							5 754	5 801	5 876	4 947	4 922	4 804
Latvia	3 817	2 054	2 142	4 504	4 524	4 542	4 635	4 679	4 654	4 360	4 449	4 240
Liechtenstein	261	147	169	300	210	238	281	231	266	290	263	282
Lithuania							4 626	4 469	4 695	4 409	4 418	4 426
Macao-China				969	1 203	1 089	3 741	3 104	4 276	4 202	5 237	3 483
Macedonia	3 939	2 298	2 435				3 983	3 478	3 872	4 530	4 442	4 222
Montenegro										3 866	3 927	3 951
Panama										5 900	5 471	5 424
Peru	4 381	2 346	1 944							8 963	8 023	5 729
Qatar							4 236	3 875	5 025	4 770	4 607	4 727
Romania	4 611	2 577	2 577				4 966	4 962	5 093	5 202	5 267	5 144
Russian Federation	6 622	3 664	3 656	5 849	5 839	5 885	5 604	5 675	5 749	4 969	5 041	4 853
Serbia				4 349	4 259	4 205	4 701	4 575	4 760	4 652	3 128	3 908
Shanghai-China										4 686	5 788	5 644
Singapore										6 119	6 213	6 028
Chinese Taipei							8 444	8 699	8 769	4 617	2 682	3 723
Thailand	5 267	2 838	2 903	4 690	5 047	4 936	6 000	5 870	6 085	4 882	4 886	4 862
Trinidad and Tobago					4 154	4 669	4 602	4 582	4 536	4 620		
Tunisia					5 403	5 743	5 777	4 640	4 556	4 689	5 767	5 486
Uruguay										5 767	5 486	5 348



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Table 11.14 Design effect 5 by country, by domain and cycle

	PISA 2000			PISA 2003			PISA 2006			PISA 2009		
	Reading	Mathematics	Science									
OECD												
Australia	6.20	4.29	3.88	5.98	6.36	5.33	6.86	9.18	7.21	7.96	10.32	8.86
Austria	3.16	1.94	2.08	6.11	5.66	5.78	7.00	7.15	7.93	5.71	5.04	6.68
Belgium	7.37	5.10	5.56	4.85	3.81	4.67	6.77	6.87	5.50	4.53	3.98	4.90
Canada	8.05	4.55	5.15	10.89	12.18	11.57	14.53	11.90	10.53	6.25	7.89	7.56
Chile	7.78	4.20	3.58				12.24	14.37	11.61	8.10	8.26	7.30
Czech Republic	3.25	2.55	2.05	8.31	8.63	7.12	8.38	7.03	7.40	5.95	5.59	5.66
Denmark	2.44	1.88	1.74	4.29	3.81	3.59	5.74	4.31	5.05	3.65	5.30	4.32
Estonia							5.77	5.67	4.43	4.74	4.73	4.75
Finland	4.04	1.93	2.23	2.38	2.88	2.60	3.29	3.80	2.62	3.95	4.01	3.98
France	4.13	2.40	2.50	3.28	3.20	3.13	7.21	5.19	5.16	4.57	4.04	5.29
Germany	2.49	1.71	1.63	4.49	4.87	4.96	7.59	7.45	7.05	3.91	4.22	3.85
Greece	12.23	6.91	6.61	7.12	7.99	6.67	7.56	5.03	5.99	10.25	9.35	9.67
Hungary	8.67	4.69	4.62	3.43	4.39	3.87	5.43	4.51	4.13	5.70	6.47	6.07
Iceland	0.84	1.33	1.14	0.84	0.83	0.79	1.52	1.60	1.08	0.79	0.85	0.80
Ireland	4.61	2.25	2.56	3.57	3.20	3.25	6.71	5.28	5.22	3.84	3.47	4.46
Israel	27.07	12.59	13.15				6.75	7.51	5.07	6.12	5.71	4.90
Italy	5.06	2.91	2.68	10.63	12.02	9.80	10.83	12.36	9.72	8.31	12.29	10.41
Japan	19.38	11.67	10.67	6.51	7.51	6.75	7.56	8.02	6.76	7.26	7.62	7.13
Korea	6.02	2.97	3.07	7.63	6.69	6.75	9.65	8.54	7.19	9.53	10.10	8.73
Luxembourg	0.89	0.90	1.13	0.87	0.44	0.83	0.75	0.59	0.54	0.67	0.68	0.64
Mexico	6.85	4.23	4.34	55.44	54.48	48.54	31.66	36.46	35.04	20.38	20.46	20.50
Netherlands	3.58	2.35	2.38	4.52	4.57	4.07	4.46	4.15	4.00	16.06	13.51	15.12
New Zealand	2.43	2.07	1.15	2.49	2.38	2.31	3.90	3.16	3.04	2.43	2.68	2.68
Norway	3.03	2.11	1.91	2.98	2.71	3.11	4.30	3.90	4.92	3.73	3.67	3.93
Poland	7.28	5.64	5.72	3.94	3.37	3.43	4.31	4.42	3.77	4.20	5.07	3.79
Portugal	9.91	5.07	5.14	7.46	6.95	6.32	6.63	5.85	5.95	7.86	6.40	7.59
Slovak Republic				8.36	9.45	9.68	4.00	4.22	3.64	3.62	4.69	4.46
Slovenia							0.83	0.90	0.85	0.79	1.02	0.92
Spain	6.35	4.07	3.31	8.01	8.00	7.34	12.39	13.51	15.74	13.79	14.01	14.25
Sweden	2.52	1.71	1.77	2.97	3.37	3.01	5.44	3.20	2.82	3.89	4.36	3.39
Switzerland	10.57	6.57	6.70	10.07	9.96	9.89	12.90	12.77	12.36	8.07	13.05	10.18
Turkey				17.91	20.08	18.29	10.12	13.65	10.52	9.22	11.30	9.92
United Kingdom	6.07	3.86	3.88	6.55	6.59	5.75	6.44	7.64	6.04	6.96	9.39	7.91
United States	17.39	12.89	11.13	5.53	5.23	5.00		11.26	8.90	7.48	8.10	7.29
Partners												
Albania	5.45	2.31	2.61							7.51	8.83	9.03
Argentina	32.83	13.49	13.53							8.75	9.14	9.60
Azerbaijan							10.24	11.49	12.68	9.12	8.75	7.99
Brazil	6.33	3.93	3.53	7.54	10.45	8.70	12.40	9.44	9.05	16.95	17.41	16.87
Bulgaria	10.76	7.00	5.83				15.53	16.54	14.74	15.69	15.79	13.89
Colombia							9.95	8.27	7.09	14.80	14.62	15.82
Croatia							5.20	4.20	4.24	5.37	6.13	5.58
Dubai (UAE)										0.64	0.66	0.75
Hong Kong-China	5.35	2.95	3.05	8.46	9.18	9.18	4.07	3.80	3.38	3.07	3.96	4.79
Indonesia	22.31	11.72	11.25	21.15	25.35	23.97	66.74	52.62	71.16	16.21	14.38	15.54
Jordan							7.86	10.14	6.49	8.61	13.06	10.22
Kazakhstan										6.16	7.18	7.07
Kyrgyzstan							6.85	9.07	7.23	5.20	6.30	5.18
Latvia	10.36	4.00	7.13	7.62	8.14	8.13	7.98	6.31	5.86	6.16	6.76	6.95
Liechtenstein	0.57	0.93	0.99	0.53	0.57	0.58	0.57	0.70	0.61	0.37	0.71	0.51
Lithuania							4.62	5.03	4.45	3.46	4.00	5.36
Macao-China				1.30	1.37	1.48	0.98	1.14	0.87	0.82	0.68	1.09
Macedonia	1.93	1.90	1.62									
Montenegro							0.81	1.15	0.79	1.65	2.76	2.61
Panama										17.22	16.82	16.12
Peru	9.34	4.12	4.86							9.66	11.82	9.15
Qatar							0.76	0.79	0.66	0.40	0.47	0.67
Romania	5.56	3.65	3.42				13.36	12.86	13.71	9.88	8.84	8.67
Russian Federation	13.69	10.24	8.48	10.63	12.37	10.29	12.48	10.82	9.71	7.34	7.98	7.12
Serbia				8.41	8.66	7.87	6.83	7.02	6.10	4.66	5.74	4.37
Shanghai-China										4.57	3.83	4.07
Singapore										0.62	1.00	0.91
Chinese Taipei							14.10	13.95	12.58	5.28	6.10	5.39
Thailand	9.53	5.62	4.69	6.76	7.01	5.78	6.21	5.09	4.78	8.40	10.37	8.71
Trinidad and Tobago										0.57	0.79	0.63
Tunisia							4.06	4.52	4.06	7.92	8.60	5.98
Uruguay							4.66	6.34	4.11	3.88	3.33	4.10

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Table 11.15 Effective sample size 5 by country, by domain and cycle

	PISA 2000			PISA 2003			PISA 2006			PISA 2009		
	Reading	Mathematics	Science									
OECD												
Australia	835	666	738	2 098	1 973	2 356	2 067	1 543	1 966	1 791	1 381	1 608
Austria	1 502	1 360	1 284	752	813	795	704	689	622	1 154	1 307	986
Belgium	905	742	670	1 815	2 311	1 883	1 308	1 290	1 610	1 877	2 135	1 734
Canada	3 686	3 626	3 199	2 568	2 296	2 416	1 558	1 904	2 150	3 711	2 943	3 071
Chile	628	648	757				428	364	451	700	686	777
Czech Republic	1 652	1 204	1 495	761	732	888	708	844	801	1 018	1 085	1 072
Denmark	1 737	1 264	1 351	982	1 108	1 174	789	1 050	898	1 624	1 118	1 371
Estonia							844	858	1 099	998	999	995
Finland	1 203	1 402	1 214	2 437	2 011	2 226	1 431	1 242	1 801	1 470	1 449	1 460
France	1 131	1 082	1 036	1 312	1 342	1 372	654	909	914	940	1 063	812
Germany	2 036	1 656	1 757	1 039	957	939	644	656	694	1 273	1 180	1 292
Greece	382	377	392	650	579	694	645	968	814	485	532	514
Hungary	564	597	606	1 388	1 086	1 232	827	995	1 086	807	712	758
Iceland	4 037	1 414	1 634	3 983	4 031	4 241	2 488	2 375	3 501	4 637	4 288	4 573
Ireland	836	948	833	1 087	1 213	1 195	684	868	878	1 025	1 134	883
Israel	166	197	191				679	611	905	942	1 009	1 175
Italy	985	950	1 033	1 095	969	1 188	2 010	1 762	2 239	3 720	2 514	2 968
Japan	271	250	273	723	627	697	787	742	880	839	799	854
Korea	828	934	899	713	814	807	536	606	719	524	494	572
Luxembourg	3 970	2 170	1 727	4 509	8 942	4 706	6 113	7 681	8 432	6 849	6 840	7 204
Mexico	671	606	587	541	550	618	978	850	884	1 877	1 869	1 866
Netherlands	699	589	587	884	874	982	1 092	1 174	1 217	296	352	315
New Zealand	1 510	988	1 762	1 811	1 897	1 950	1 237	1 524	1 587	1 910	1 733	1 733
Norway	1 369	1 093	1 208	1 363	1 500	1 305	1 092	1 202	954	1 248	1 268	1 187
Poland	502	350	357	1 114	1 299	1 279	1 286	1 255	1 472	1 172	970	1 296
Portugal	462	502	496	618	663	729	770	873	858	801	983	829
Slovak Republic				879	778	759	1 183	1 121	1 298	1 258	972	1 022
Slovenia							7 979	7 344	7 803	7 757	6 053	6 716
Spain	979	841	1 046	1 346	1 349	1 469	1 582	1 451	1 246	1 877	1 847	1 816
Sweden	1 749	1 441	1 379	1 559	1 371	1 535	817	1 387	1 574	1 174	1 048	1 347
Switzerland	577	517	507	836	846	852	945	954	986	1 463	905	1 160
Turkey				271	242	266	488	362	470	542	442	504
United Kingdom	1 540	1 345	1 336	1 455	1 446	1 657	2 042	1 722	2 176	1 749	1 297	1 539
United States	221	166	191	987	1 043	1 090		498	630	699	646	718
Partners												
Albania	913	1 206	1 063							612	520	509
Argentina	121	165	163				300	262	277	546	522	497
Azerbaijan							506	451	409	514	536	587
Brazil	773	692	768	591	426	512	749	984	1 027	1 188	1 156	1 193
Bulgaria	433	374	436				290	272	305	287	285	325
Colombia							450	542	632	535	542	501
Croatia							1 002	1 242	1 230	931	814	895
Dubai (UAE)										8 737	8 465	7 498
Hong Kong-China	823	827	799	529	488	488	1 140	1 224	1 374	1 575	1 221	1 009
Indonesia	330	349	362	509	424	449	160	202	150	317	357	331
Jordan							829	642	1 003	753	496	634
Kazakhstan										878	754	765
Kyrgyzstan							862	651	817	958	791	963
Latvia	376	537	303	607	568	569	592	748	806	731	666	648
Liechtenstein	547	189	178	632	579	573	591	486	557	881	467	651
Lithuania							1 026	943	1 066	1 307	1 133	844
Macao-China				962	910	845	4 853	4 186	5 469	7 289	8 690	5 445
Macedonia	2 341	1 341	1 558				5 467	3 877	5 645	2 929	1 746	1 848
Montenegro										230	236	246
Panama										619	506	654
Peru	474	597	506				8 232	7 881	9 556	22 777	19 415	13 539
Qatar							383	398	373	484	540	551
Romania	869	735	788				465	536	597	723	665	746
Russian Federation	490	363	438	562	483	580						
Serbia				524	509	559	703	683	786	1 185	963	1 263
Shanghai-China										1 119	1 334	1 258
Singapore										8 519	5 258	5 828
Chinese Taipei							625	632	701	1 105	956	1 082
Thailand	560	527	632	775	747	906	997	1 216	1 297	741	600	715
Trinidad and Tobago				1 163	1 045	1 163	586	539	776	8 355	6 031	7 641
Tunisia				1 253	921	1 421	1 246	1 451	1 179	875	675	918
Uruguay										1 454	1 248	1 407



SUMMARY ANALYSES OF THE DESIGN EFFECT

To better understand the evolution of the design effect for a particular country across the PISA cycles, 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 school sample size, which are provided in Table A3.2;
- **the school variance**, school variance estimates and the intraclass correlation, which are provided respectively in Table A3.3 and Table A3.4; and
- **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 Table A3.5 and Table A3.6.

Finally, the standard errors on the mean performance estimates are provided in Table A3.1.

Table 11.16 to Table 11.21 present the median of the indices presented in Table 11.10 and in Table A3.1 to Table A3.6 by cycle and per domain.

Table 11.16 Median of the design effect 3 per cycle and per domain across the 35 countries that participated in every cycle

	Reading	Mathematics	Science
PISA 2000	5.90	3.68	2.93
PISA 2003	6.02	6.25	5.45
PISA 2006	6.69	6.26	5.63
PISA 2009	5.96	6.40	6.61

In PISA 2000, student performance estimates for a particular domain were only provided for students who responded to testing material from that domain, while for PISA 2003 onwards student proficiency estimates were provided for all domains. For PISA 2000 about five-ninths of the students were assessed in the minor domains (Adams and Wu, 2002). This difference explains why the design effects in mathematics and science for PISA 2000 are so low in comparison with all other design effects.

Table 11.17 presents summary information about the standard errors of national mean achievement across PISA cycles.

Table 11.17 Median of the standard errors of the student performance mean estimate for each domain and PISA cycle for the 35 countries that participated in every cycle

	Reading	Mathematics	Science
PISA 2000	3.10	3.26	3.18
PISA 2003	2.88	3.00	3.08
PISA 2006	3.18	2.89	2.79
PISA 2009	2.66	2.83	2.80

With the exception of reading literacy in PISA 2006, the standard errors, on average, have decreased between the PISA 2000 and PISA 2009 data collection. This decrease is associated with the continuously increasing school sample size. Note that, generally speaking, the sample size increase in a given country, in PISA 2009 compared with earlier cycles, was intended to provide adequate data for regional or other subgroup estimates. Consequently the reduction in standard error for the national mean achievement was often not particularly great for countries with a noticeable increase in sample size. In other words, the sample size increased, but so did the design effects for the participating countries mean achievement estimates.

This reduction of the standard errors might also be explained by a better efficiency of the explicit stratification variables. Although as can be found in Table 11.22 the median percentage of school variance explained by explicit stratification variables has not consistently risen or fallen over the four cycles.



Table 11.18 shows that median school sample sizes have generally been increasing across PISA cycles from 174 schools in PISA 2000 to 193 schools in PISA 2009.

Table 11.18 Median of the number of participating schools for each domain and PISA cycle for the 35 countries that participated in every cycle

	Number of schools
PISA 2000	174
PISA 2003	193
PISA 2006	190
PISA 2009	193

Table 11.19 shows information about the size of the between-school variance across PISA cycles.

Table 11.19 Median of the school variance estimate for each domain and PISA cycle for the 35 countries that participated in every cycle

	Reading	Mathematics	Science
PISA 2000	3 305	3 127	2 574
PISA 2003	2 481	2 620	2 270
PISA 2006	2 982	2 746	2 502
PISA 2009	2 256	2 481	2 266

To understand the pattern of school variance estimates, it is important to recall how the school membership was implemented in the conditioning model. In PISA 2000 and PISA 2003, the conditioning variable consists of the school average of student performance weighted maximum likelihood estimates in the major domain. In PISA 2006 and PISA 2009, the conditioning variables consist of $n-1$ dummy variables, with n being the number of participating schools (see Chapter 9). The method used in the first two PISA studies seemed to generate an underestimation of the school variance estimates in the minor domains. This bias might therefore explain why the largest school variance estimate in PISA 2000 and in PISA 2003 was associated with the major domain, respectively reading literacy and mathematic literacy.

Table 11.20 Median of the intraclass correlation for each domain and PISA cycle for the 35 countries that participated in every cycle

	Reading	Mathematics	Science
PISA 2000	0.37	0.36	0.33
PISA 2003	0.30	0.34	0.28
PISA 2006	0.38	0.36	0.35
PISA 2009	0.33	0.33	0.34

Table 11.21 Median of the within explicit strata intraclass correlation for each domain and PISA cycle for the 35 countries that participated in every cycle

	Reading	Mathematics	Science
PISA 2000	0.25	0.22	0.23
PISA 2003	0.20	0.23	0.19
PISA 2006	0.26	0.23	0.20
PISA 2009	0.20	0.22	0.22



Table 11.22 Median of the percentages of school variances explained by explicit stratification variables, for each domain and PISA cycle for the 35 countries that participated in every cycle

	Reading	Mathematics	Science
PISA 2000	20.1	17.9	18.8
PISA 2003	22.5	21.6	20.5
PISA 2006	33.7	25.6	29.9
PISA 2009	31.2	27.6	30.8

Sampling for the Digital Reading Assessment (DRA) component

Nineteen countries and economies participated in DRA: Australia, Austria, Belgium, Chile, Colombia, Denmark, France, Hong Kong-China, Hungary, Iceland, Ireland, Japan, Korea, Macao-China, New Zealand, Norway, Poland, Spain, and Sweden. When a country participated in the DRA option, it was expected that DRA student sampling would occur in every PISA sampled and participating school.

The overall sample size requirement was 1 200 assessed DRA students. The recommended DRA Target Cluster Size (DTCS) was 14 students per sampled school. While 14 students for each of 150 (the typical number of PISA schools) would potentially yield 2 100 students, the large DTCS was chosen to account for the fact that some schools would not have adequate computer resources. The DTCS sample size of 14 also accounted for the loss in the DRA sample that would accrue from prior losses in the PISA sample. It was a requirement that all DRA students also participate in a paper and pencil PISA assessment. The DRA student sample was selected at the same time the PISA student sample was selected in each school by the PISA Consortium sampling software. Therefore, any PISA student also sampled for DRA who did not provide a paper-based PISA assessment was an automatic loss for DRA. In addition, there would be additional loss of students for DRA due to refusals or other absences. It was possible to vary this DRA target cluster size if more than the usual number of schools was sampled for PISA.

The actual DRA student sample size at each school was calculated with *KeyQuest*, as the minimum of the DTCS, and the number of sampled PISA students. Arrangements had to be made with participating schools to either bring in laptops, or to have extra sessions to alleviate any computer resource problems.

If a participating country had a large PISA school sample and wished to subsample the PISA sampled schools where DRA student sampling would be done, this became an additional national option. Only two DRA countries, Colombia and Spain, chose to have schools subsampled for DRA from their large national school sample.

The schools in Colombia and Spain for DRA were subsampled with equal probability from sampled schools in each explicit stratum. The number to subsample for DRA in each stratum was based on how many schools would have been needed from each explicit stratum for a school sample of 150 schools. Any schools selected with certainty for the large national school sample and placed in their own stratum, were added back to their original strata for the subsampling of DRA schools.

Weighting for DRA

No non-response adjustments were made for schools or students sampled for DRA which did not participate. Since DRA was being treated as a domain like mathematics and science, absent DRA students were treated in the same manner as a student not assigned a booklet containing items in the mathematics or science domain. Plausible values were generated for these DRA students, as well as for all other students who had not been subsampled for DRA.

The second level of sampling for DRA for Spain and Colombia needed to be accounted for in weighting, via an additional weight component. Thus, schools subsampled for DRA for Spain and Colombia had their own weighting stream, separate from the weighting stream for the large national samples in these countries. Once in their own weighting stream, weighting procedures for these DRA subsampled schools and students were the same as the weighting procedures used for all countries.

Table 11.23 DRA student sampling outcomes

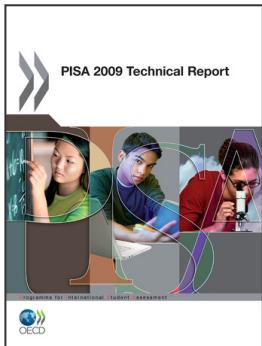
	N of students included in DRA database	Weighted N of students included in DRA database	N of students sampled for DRA	Weighted N of student sampled for DRA	N of students participated in DRA	Weighted N of students participated in DRA	DRA student response rate (unweighted)
OECD							
Australia	14 251	240 851	3 673	59 464	2 990	49 779	81
Austria	6 590	87 326	3 187	43 001	2 622	34 754	82
Belgium	8 501	119 140	3 161	47 254	2 796	41 556	88
Chile	5 669	247 270	2 131	94 433	1 699	75 482	80
Colombia	4 572	515 130	1 957	223 457	1 478	163 491	76
Denmark*	5 924	60 854	1 830	19 564	1 270	13 753	69
Spain	4 748	385 725	1 989	165 230	1 681	140 449	85
France	4 298	677 620	1 730	276 591	1 301	207 231	75
Hong Kong-China	4 837	75 548	1 661	25 914	1 450	22 682	87
Hungary	4 605	105 611	2 022	49 903	1 792	44 398	89
Ireland	3 937	52 794	1 710	22 874	1 407	18 851	82
Israel	3 646	4 410	1 273	1 532	960	1 155	75
Japan*	6 088	1 113 403	6 088	1 113 403	3 429	622 985	56
Korea	4 989	630 030	1 508	189 368	1 477	185 078	98
Macao-China	5 952	5 978	2 540	2 555	2 519	2 534	99
Norway	4 660	57 367	2 268	28 309	1 972	24 268	87
New Zealand	4 643	55 129	2 180	25 953	1 752	21 137	80
Poland	4 917	448 866	2 072	185 403	1 986	177 008	96
Sweden	4 567	113 054	2 249	55 563	1 921	47 350	85

* These countries had lower response rates because of schools that were unable to participate because of technical difficulties.

Table 11.24 DRA school sampling outcomes

	N of schools included in DRA database	Weighted N of schools included in DRA database	N of schools sampled for DRA	Weighted N of schools sampled for DRA	N of schools participated in DRA	Weighted N of schools participated in DRA	DRA school response rate (unweighted)
OECD							
Australia	353	2 284	353	2 284	334	2 132	95
Austria	282	2 758	273	2 535	256	2 231	94
Belgium	278	1 687	262	1 531	247	1 378	94
Chile	200	4 872	200	4 872	198	4 812	99
Colombia	159	9 411	158	9 393	136	7 942	86
Denmark*	285	1 686	285	1 686	220	1 236	77
Spain	168	7 109	168	7 109	163	6 959	97
France	168	11 380	168	11 380	140	8 959	83
Hong Kong-China	151	489	151	489	149	483	99
Hungary	187	3 496	187	3 496	183	3 371	98
Ireland	144	681	144	681	141	664	98
Israel	131	135	131	135	118	121	90
Japan*	186	6 740	186	6 740	109	3 717	59
Korea	157	4 265	157	4 265	156	4 254	99
Macao-China	45	45	44	44	44	44	100
Norway	197	1 120	197	1 120	180	916	91
New Zealand	163	429	163	429	145	355	89
Poland	185	7 326	179	6 274	179	6 274	100
Sweden	189	1 989	189	1 989	179	1 842	95

* These countries had lower response rates because schools that were unable to participate because of technical difficulties.



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