

# Appendix C

## The Test-Curriculum Matching Analysis: Mathematics

To ensure that comparisons of student achievement across countries would be as fair and equitable as possible, TIMSS developed extensive assessment frameworks and specifications that addressed the important aspects of mathematics in countries' curricula and instructional programs, and went to great lengths to develop assessment items that faithfully represented those specifications. Similar to the procedures used for developing the original TIMSS instruments, developing the TIMSS 2003 tests involved a series of reviews by representatives of the participating countries, experts in mathematics, and testing specialists.<sup>1</sup> The National Research Coordinators (NRCs) from each country formally approved the TIMSS 2003 tests, thus accepting them as being sufficiently fair to compare their students' mathematics achievement with that of students from other countries.

Although the tests were developed to represent an agreed-upon framework and were intended to have as much in common across countries as possible, it was inevitable that the match between the TIMSS 2003 test and the mathematics curriculum would not be the same in all countries. To restrict test items to just those topics included in the curricula of all participating countries and covered in the same sequence would severely limit test coverage and restrict the research

<sup>1</sup> See Appendix A for more information on test development.

questions that the study is designed to address. The tests, therefore, inevitably have some items measuring topics unfamiliar to some students in some countries.

The Test-Curriculum Matching Analysis (TCMA) was conducted to investigate the appropriateness of the TIMSS 2003 mathematics test for the eighth- and fourth-grade students in the participating countries. TCMA also shows how student performance for individual countries varies when based only on the test questions that are judged to be relevant to their own curricula.<sup>2</sup>

To gather data about the extent to which the TIMSS 2003 tests were relevant to the curricula of the participating countries, each NRC reported whether each item was in that country's intended curriculum at the grade tested (eighth or fourth grade in most countries). The NRC was asked to choose a person (or persons) who was very familiar with the curriculum at these grades to make this determination. Since an item might be in the curriculum for some but not all students in a country, an item was to be determined appropriate if it was in the intended curriculum for more than 50 percent of the students. The NRCs had considerable flexibility in selecting items and may have considered items inappropriate for other reasons. All participants returned the information for analysis except Syria at eighth grade and Yemen at fourth grade.

Exhibits C.1 and C.2 present the TCMA results for the TIMSS 2003 tests at eighth and fourth grades. Exhibit C.1 shows the average percent correct on the mathematics items selected as appropriate by each country. Exhibit C.2 shows the standard errors corresponding to the percentages presented in Exhibit C.1.

In Exhibit C.1, the last row of the exhibit shows that the countries varied substantially in the number of items (score points) identified as appropriate.<sup>3</sup> At the eighth grade, the percentage of score points ranged from 100 percent (213 score points) in Israel and Saudi Arabia to 71 percent (151 score points) in Ghana. Forty-seven of the

2 Because there may also be curriculum areas covered in some countries that are not covered by the TIMSS 2003 tests, the TCMA does not provide complete information about how well the tests cover the curricula of the countries.

3 Some items were assigned more score points than others. In particular, some items had two parts, and some extended-response items were scored on a two-point scale. The TCMA uses score points in order to give the same weight to items given them in test scoring.

50 participants indicated that items representing three-quarters or more of the score points (160 out of a possible 213) were appropriate. At the fourth grade, the percentage of score points ranged from 99 percent (164 score points) in Latvia, Lithuania, the United States, Moldova, and Armenia to 51 percent (85 score points) in Tunisia. Twenty-three of the 28 fourth-grade participants indicated that items representing three-quarters or more of the score points (125 out of a possible 166) were appropriate.

Since most countries indicated that some items were not included in their intended curricula at the grade tested, the data were analyzed to determine whether the inclusion of these items had any effect on the international performance comparisons.<sup>4</sup>

The first column in Exhibit C.1 shows the average percent correct on all test items for each participant. Subsequent columns show the performance of each participant on those items judged appropriate by the participant listed at the head of the column. Participants are presented in order of their performance based on average percent correct on all items, from highest to lowest. To interpret this exhibit, reading across a row provides the average percent correct for the students in that country on the items selected by each of the countries listed across the top of the exhibit. For example, at the eighth-grade, Singapore, where the average percent correct was 72 percent on its own set of items, also had 71 percent correct for the items selected by Korea, 72 percent for the items selected by Hong Kong SAR, and so forth. The column for a country listed across the top shows how each of the other participants performed on the subset of items selected as appropriate for that country's students. Using the set of items selected by the Slovak Republic as an example, on average, 71 percent of these items were answered correctly by students in Singapore, 68 percent by students in Korea, 67 percent by those in Hong Kong SAR, and so forth. The shaded diagonal element in the exhibit shows how each country performed on the subset of items that it selected based on its

4 It should be noted that the mathematics achievement presented in Exhibit C.1 is based on average percent correct, which is different from the average scale scores that are presented in Chapter 1.





**Exhibit C.1: Average Percent Correct for Test-Curriculum Matching Analysis – Mathematics**

Based on Subset of Items Specially Identified by Each Country as Addressing its Curriculum  
(See Exhibit C.2 for corresponding standard errors)

Instructions: Read **across** the row to compare that country's performance based on the test items included by each of the countries across the top. Read **down** the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the **diagonal** to compare performance for each different country based on its own decisions about the test items to include.

																									Average Percent Correct on All Items				Countries
Bulgaria	Armenia	Cyprus	Moldova, Rep. of	Norway	Macedonia, Rep. of	Lebanon	Jordan	Indonesia	Egypt	Iran, Islamic Rep. of	Bahrain	Tunisia	Chile	Palestinian Nat'l Auth.	Philippines	Morocco	Botswana	Saudi Arabia	South Africa	Ghana	Basque Country, Spain	Indiana State, US	Ontario Province, Can.	Quebec Province, Can.					
71	71	71	71	72	73	72	69	71	74	71	72	73	72	72	72	71	71	71	75	74	72	71	72	71	71 (0.9)	Singapore			
68	68	68	68	68	68	68	66	68	71	68	68	69	67	68	69	68	68	68	70	70	69	68	68	68	68 (0.4)	Korea, Rep. of			
67	67	67	67	68	68	67	65	67	70	67	67	68	67	67	68	67	67	67	71	69	68	67	68	67	67 (0.8)	Hong Kong, SAR			
65	66	66	66	66	67	66	64	66	69	66	66	66	65	66	67	65	66	66	69	67	66	66	66	66	66 (1.0)	Chinese Taipei			
63	63	63	63	64	63	63	61	63	66	63	63	64	63	64	64	63	64	64	64	65	64	63	64	64	64 (0.5)	Japan			
55	56	55	56	58	56	56	52	56	58	56	56	57	57	56	56	55	57	56	59	58	56	56	57	56	56 (0.7)	Belgium (Flemish)			
54	55	54	55	57	53	54	50	55	56	54	55	55	57	55	55	54	56	55	57	58	55	55	57	55	55 (1.0)	Netherlands			
54	55	54	55	56	55	55	52	55	57	55	55	56	56	55	55	54	56	55	58	56	55	55	55	55	55 (0.8)	Hungary			
53	54	53	54	56	54	54	51	54	56	54	54	55	55	54	55	53	55	54	57	56	54	54	55	54	54 (0.8)	Estonia			
48	49	49	49	50	51	49	48	49	48	49	49	51	49	49	51	49	49	49	54	52	50	49	49	49	49 (0.9)	Russian Federation			
48	48	49	48	50	50	49	46	48	51	49	49	51	50	49	50	48	49	49	53	52	49	49	49	49	49 (0.8)	Slovak Republic			
48	48	48	48	49	49	49	46	48	51	48	48	50	48	48	49	48	49	48	52	51	49	48	49	48	48 (0.8)	Latvia			
47	48	47	48	50	47	48	44	48	50	48	48	48	50	48	48	47	49	48	49	50	49	48	50	48	48 (1.1)	Australia			
47	48	47	48	49	48	48	45	48	51	48	48	49	50	48	49	47	48	48	53	51	48	48	49	48	48 (1.0)	Malaysia			
46	47	47	47	49	46	47	44	47	49	47	47	48	47	48	47	48	49	48	49	49	48	48	48	48	48 (0.8)	United States			
46	47	46	47	48	47	47	45	47	49	47	47	48	47	47	48	46	48	47	50	49	47	47	48	47	47 (0.6)	Lithuania			
46	47	46	47	49	45	46	41	47	48	46	46	46	49	47	46	46	49	47	48	49	47	47	48	47	47 (0.7)	Sweden			
45	46	45	46	48	44	46	41	46	47	45	46	46	48	46	46	45	47	46	46	48	47	47	48	46	46 (1.0)	Scotland			
45	46	45	46	48	44	46	41	46	47	45	46	45	47	46	46	45	47	46	46	48	46	46	47	46	46 (1.2)	England			
45	46	45	46	47	46	46	43	46	48	45	45	47	46	46	45	47	46	49	48	46	46	46	46	46 (0.8)	Israel				
44	45	44	45	47	43	44	40	45	46	44	45	44	46	45	44	44	46	45	45	46	45	45	46	45	45 (1.3)	New Zealand			
43	44	43	44	45	44	44	41	44	46	44	44	45	45	44	45	43	45	44	47	46	44	44	45	44	44 (0.6)	Slovenia			
42	43	43	43	44	43	43	40	43	45	43	43	44	44	43	43	42	44	43	46	45	43	43	44	43	43 (0.7)	Italy			
41	41	42	41	42	43	42	41	41	44	42	41	43	42	42	43	41	42	42	46	44	42	42	42	41	42 (1.1)	Romania			
41	41	41	41	42	43	41	40	41	44	42	41	43	41	41	43	41	42	41	46	44	42	41	41	41	41 (0.6)	Serbia			
40	40	41	40	41	42	41	39	40	43	41	40	43	41	40	42	40	41	41	44	43	41	40	41	40	41 (0.9)	Bulgaria			
39	39	40	39	39	42	40	40	39	42	40	39	41	37	40	41	39	39	39	44	40	40	39	39	39	39 (0.7)	Armenia			
36	37	38	37	38	38	38	36	37	40	38	37	39	38	37	38	37	38	37	41	40	38	37	38	37	37 (0.3)	Cyprus			
37	37	37	37	38	39	37	37	37	40	37	37	39	37	37	39	37	37	37	41	40	37	37	37	37	37 (0.8)	Moldova, Rep. of			
36	37	36	37	39	36	37	33	37	38	37	36	37	39	37	37	36	38	37	38	39	37	37	38	37	37 (0.5)	Norway			
33	33	33	33	34	34	33	32	33	35	33	33	35	33	33	34	33	34	33	36	35	34	33	33	33	33 (0.6)	Macedonia, Rep. of			
32	31	32	31	32	34	32	33	31	34	32	32	33	31	32	34	32	31	32	36	33	32	31	31	31	32 (0.6)	Lebanon			
30	31	30	31	31	31	31	32	31	32	31	30	32	30	31	31	30	31	31	32	32	31	31	31	30	31 (0.7)	Jordan			
29	29	29	29	30	30	29	29	29	29	31	29	29	30	29	30	29	30	29	32	31	30	29	30	29	29 (0.7)	Indonesia			
28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	32	30	29	28	28	28	28 (0.5)	Egypt			
27	28	28	28	28	29	28	28	28	30	28	28	29	28	28	29	27	28	28	30	30	28	28	28	28	28 (0.4)	Iran, Islamic Rep. of			
27	27	27	27	28	27	27	28	27	29	27	27	28	28	27	28	27	28	27	28	29	27	27	28	27	27 (0.2)	Bahrain			
27	27	27	27	28	28	28	27	27	29	27	27	30	28	27	28	27	27	27	30	29	27	27	27	27	27 (0.4)	Tunisia			
26	27	26	27	28	26	27	24	27	28	26	26	27	28	26	27	26	27	27	28	29	27	27	28	26	27 (0.5)	Chile			
25	26	26	26	26	27	26	26	26	28	26	26	27	26	26	27	25	26	26	28	27	26	26	26	26	26 (0.4)	Palestinian Nat'l Auth.			
24	25	25	25	25	25	25	25	25	27	25	25	25	25	25	26	24	25	25	28	26	25	25	25	25	25 (0.8)	Philippines			
24	24	24	24	25	25	25	25	24	26	25	25	26	25	24	25	24	25	25	27	26	25	24	25	24	25 (0.4)	Morocco			
22	23	22	23	24	23	23	22	23	25	23	23	24	24	23	24	23	24	23	26	24	23	23	24	23	23 (0.3)	Botswana			
18	19	19	19	19	19	19	19	19	20	19	19	20	19	19	20	18	19	19	21	20	19	19	19	19	19 (0.3)	Saudi Arabia			
16	17	16	17	17	17	17	17	17	18	17	16	17	17	17	17	16	17	17	18	18	17	17	17	16	17 (0.7)	South Africa			
14	15	15	15	15	15	15	15	15	16	15	15	15	15	15	15	14	15	15	17	16	15	15	15	15	15 (0.4)	Ghana			
40	41	41	41	42	42	41	39	41	43	41	41	42	42	41	42	41	42	41	44	43	42	41	42	41	41 (0.1)	International Avg.			
<b>Benchmarking Participants</b>																													
42	43	43	43	45	43	44	40	43	45	43	43	45	44	43	44	43	45	43	46	46	44	44	44	43	43 (0.7)	Basque Country, Spain			
46	47	47	47	49	46	47	44	47	49	47	47	48	48	47	48	47	49	47	50	49	48	48	48	48	47 (1.3)	Indiana State, US			
51	51	51	51	53	50	51	47	51	53	51	51	51	53	51	51	51	53	52	53	53	52	52	53	52	52 (0.7)	Ontario Province, Can.			
57	57	57	57	59	58	57	54	57	60	57	57	58	59	57	58	56	59	57	60	60	58	58	58	58	57 (0.9)	Quebec Province, Can.			
196	209	197	209	188	174	189	152	209	192	203	199	162	164	207	192	198	184	213	128	151	210	206	195	201	213	Number of Items (Score Points) Identified*			

\* Of the 194 items in the Mathematics test, some extended-response items were scored on a two-point scale, resulting in 215 total score points. Following item review, response categories were combined for a number of items, resulting in 213 score points.

() Standard errors appear in parentheses

**Exhibit C.1: Average Percent Correct for Test-Curriculum Matching Analysis – Mathematics**

Based on Subset of Items Specially Identified by Each Country as Addressing its Curriculum  
(See Exhibit C.2 for corresponding standard errors)



Instructions: Read **across** the row to compare that country's performance based on the test items included by each of the countries across the top. Read **down** the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the **diagonal** to compare performance for each different country based on its own decisions about the test items to include.

Countries	Average Percent Correct on All Items	Singapore					Hong Kong, SAR					Japan					Chinese Taipei					Belgium (Flemish)					Netherlands					Lithuania					Latvia					England					Russian Federation					Hungary					United States					Cyprus					Moldova, Rep. of					Italy					Australia					New Zealand					Scotland					Slovenia					Norway					Armenia					Iran, Islamic Rep. of					Philippines					Morocco					Tunisia					Indiana State, US					Ontario Province, Can.					Quebec Province, Can.				
		Singapore	Hong Kong, SAR	Japan	Chinese Taipei	Belgium (Flemish)	Netherlands	Lithuania	Latvia	England	Russian Federation	Hungary	United States	Cyprus	Moldova, Rep. of	Italy	Australia	New Zealand	Scotland	Slovenia	Norway	Armenia	Iran, Islamic Rep. of	Philippines	Morocco	Tunisia	Indiana State, US	Ontario Province, Can.	Quebec Province, Can.																																																																																																																
Singapore	74 (1.2)	74	74	73	76	75	76	73	73	73	77	73	73	74	73	76	73	75	73	73	75	73	75	78	74	78	75	76	73	75	78	74	78	75	76	73	75	78	74	78	75	76	73	75	78	74	78																																																																																														
Hong Kong, SAR	70 (0.7)	70	69	70	72	71	73	70	70	69	74	69	70	70	70	74	70	71	69	70	71	70	71	73	70	74	71	72	70	71	73	70	74	71	72	70	71	73	70	74	71	72	70	71	73	70	74																																																																																														
Japan	69 (0.4)	68	69	70	73	70	71	69	69	68	73	69	69	69	72	69	70	68	69	70	69	70	69	69	72	69	71	69	69	72	69	71	69	72	69	71	69	72	69	71	69	72	69	71	69	72	69	71																																																																																													
Chinese Taipei	69 (0.5)	68	68	69	73	70	72	69	69	68	73	68	69	69	72	69	70	68	69	70	69	70	72	69	73	70	71	69	72	69	71	69	72	69	71	69	72	69	71	69	72	69	71	69	72	69	71																																																																																														
Belgium (Flemish)	65 (0.4)	65	65	65	69	67	68	65	65	65	70	65	65	66	65	69	66	67	65	65	67	65	67	67	66	69	66	68	65	67	67	66	69	66	68	65	67	66	69	66	68	65	67	66	69	66	68																																																																																														
Netherlands	62 (0.5)	62	61	62	66	64	66	62	62	61	67	62	62	62	62	66	63	64	62	62	64	62	63	62	62	65	63	62	62	63	62	62	65	63	62	62	65	63	62	62	65	63	62	62	65	63	62																																																																																														
Lithuania	62 (0.6)	62	62	62	64	63	65	61	61	61	69	62	61	62	61	65	62	64	61	63	64	61	63	66	63	67	63	65	62	63	66	63	67	63	65	62	63	66	63	67	63	65	62	63	66	63	67																																																																																														
Latvia	61 (0.7)	61	62	63	65	63	65	61	61	61	69	62	61	62	61	64	62	64	61	63	64	61	64	65	62	68	63	64	62	63	65	62	68	63	64	62	68	63	64	62	68	63	64	62	68	63	64																																																																																														
England	61 (0.8)	61	60	61	63	62	63	61	61	60	73	61	61	60	61	64	62	63	61	61	62	61	61	61	62	61	64	61	61	61	61	61	62	61	61	62	61	61	62	61	61	62	61	61	62	61	61																																																																																														
Russian Federation	60 (1.0)	60	60	61	64	61	63	60	60	60	70	61	60	60	60	64	60	62	60	62	62	60	63	66	62	67	62	63	61	66	62	63	61	67	62	63	61	67	62	63	61	67	62	63	61	67																																																																																															
Hungary	60 (0.7)	60	61	61	63	62	63	60	60	60	67	61	60	60	60	64	61	63	60	62	62	60	63	64	61	67	61	63	60	62	60	63	64	61	67	61	63	60	62	60	63	64	61	67	61	63	60																																																																																														
United States	58 (0.6)	58	57	58	61	60	60	58	58	57	62	58	58	58	62	58	61	58	58	59	58	60	60	58	61	59	61	58	60	60	58	61	59	61	58	60	58	61	59	61	58	60	58	61	59	61	58																																																																																														
Cyprus	57 (0.5)	58	58	58	61	59	60	57	57	57	63	57	57	57	61	58	60	57	58	59	57	59	61	57	62	59	60	57	58	59	61	57	62	59	60	57	62	59	60	57	62	59	60	57	62	59	60																																																																																														
Moldova, Rep. of	54 (1.0)	55	55	55	58	56	57	54	54	54	63	54	54	55	54	58	55	57	53	55	56	54	57	60	55	61	56	57	54	57	60	55	61	56	57	54	57	60	55	61	56	57	54	57	60	55	61																																																																																														
Italy	54 (0.8)	54	54	54	58	56	56	54	54	54	59	54	54	54	59	55	56	53	55	56	54	57	57	55	58	55	57	54	57	54	57	55	58	55	57	54	57	55	58	55	57	54	57	55	58	55	57																																																																																														
Australia	53 (0.9)	53	52	53	56	54	55	53	53	53	57	53	53	52	53	57	54	56	53	54	55	53	54	53	55	53	57	54	56	53	54	53	55	53	54	53	55	53	54	53	55	53	54	53	55	53	54																																																																																														
New Zealand	52 (0.5)	52	51	52	54	53	54	52	52	51	55	52	52	51	52	55	53	55	52	53	53	52	53	53	52	53	52	53	53	52	53	53	52	53	52	53	53	52	53	53	52	53	53	52	53	53	52																																																																																														
Scotland	51 (0.8)	51	51	52	54	53	54	51	51	51	55	51	51	51	51	55	52	54	52	52	53	51	53	52	54	52	53	51	53	52	52	54	52	53	51	53	52	52	54	52	53	51	53	52	52	54																																																																																															
Slovenia	48 (0.5)	48	48	49	51	49	51	48	48	48	55	49	48	48	48	52	49	51	49	50	50	48	51	50	49	53	49	51	49	53	49	53	49	51	49	53	49	53	49	51	49	53	49	51	49	53	49																																																																																														
Norway	43 (0.5)	43	43	44	46	45	46	44	44	43	48	44	44	43	44	47	44	46	44	44	45	44	45	44	46	44	46	44	45	44	45	44	46	44	45	44	46	44	45	44	46	44	45	44	46	44	45																																																																																														
Armenia	42 (0.7)	43	43	43	46	44	44	42	42	42	51	42	42	43	42	45	42	43	41	43	44	42	45	49	43	50	44	43	42	45	49	43	50	44	43	42	45	49	43	50	44	43	42	45	49	43																																																																																															
Iran, Islamic Rep. of	32 (0.6)	32	33	32	35	33	34	32	32	31	37	31	32	31	32	35	32	34	31	32	32	32	35	37	32	37	32	33	32	35	37	32	37	32	33	32	35	37	32	37	32	33	32	35	37	32																																																																																															
Philippines	29 (1.4)	29	28	28	31	30	30	29	29	28	32	28	29	29	29	32	29	30	27	28	29	29	30	29	31	29	30	27	28	29	30	29	31	29	30	29	31	29	30	29	31	29	30	29	31	29	30																																																																																														
Morocco	25 (0.7)	25	25	25	27	26	26	25	25	24	29	24	25	25	25	27	25	26	24	25	25	26	26	25	29	25	26	24	25	26	25	29	25	26	25	29	25	26	25	29	25	26	25	29	25	26																																																																																															
Tunisia	24 (0.7)	24	25	24	27	25	26	24	24	24	30	24	24	24	26	24	25	23	24	25	24	25	28	25	30	24	25	23	24	25	28	25	30	24	25	28	25	30	24	25	28	25	30	24	25																																																																																																
International Avg.	53 (0.2)	53	53	54	57	55	56	53	53	53	59	53	53	53	57	54	56	53	54	55	53	55	56	54	58	54	56	53	54	55	53	55	56	54	58	54	56	53	54	55	53	55	56	54	58	54	56																																																																																														
<b>Benchmarking Participants</b>																																																																																																																																													
Indiana State, US	61 (0.7)	61	61	61	65	63	63	61	61	60	65	61	61	61	61	65	61	64	61	61	62	61	63	64	61	64	62	64	61	63	64	61	64	62	64	61	63	64	61	64	62	64	61	63	64	61	64																																																																																														
Ontario Province, Can.	56 (0.9)	56	55	56	60	58	59	57	57	56	59	57	57	56	57	60	58	60	57	57	58	57	58	57	58	57	58	57	58	57	58	57	58	57	58	57	58	57	58	57	58	57	58	57	58	57	58	57	58																																																																																												
Quebec Province, Can.	55 (0.6)	55	55	56	59	57	58	55	55	55	60	55	55	55	59	56	58	56	56	57	55	58	57	56	59	56	58	56	56	57	55	58	57	56	59	56	58	57	56	59	56	58	57	56	59	56	58																																																																																														
Number of Items (Score Points) Identified*	166	151	116	131	117	144	138	164	164	161	95	160	164	159	164	138	157	138	139	145	150	164	135	91	152	85	149	136	143																																																																																																																

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

\* Of the 161 items in the Mathematics test, some extended-response items were scored on a two-point scale, resulting in 169 total score points. Following item review, some items were deleted and response categories were combined for a number of items, resulting in 159 items and 166 score points.

( ) Standard errors appear in parentheses

own curriculum. Thus, Slovakian students averaged 49 percent correct on the set of items identified by the Slovak Republic for the analysis.

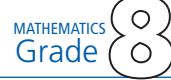
The international averages of each country's selected items are presented in the lower part of the exhibit. They show that the selection of items for the participating countries varied somewhat in average difficulty, ranging from 39 percent for those chosen by Jordan at the eighth grade to 45 percent for those chosen by Italy. Similarly at the fourth grade, the average percent correct ranged from 53 percent for those items chosen by England and Scotland to 59 percent for those chosen by the Russian Federation. Despite these differences in the difficulty of the selected items, the overall message of Exhibit C.1 is that different item selections do not make a major difference in how well countries perform relative to one another. The items selected by some countries were more difficult than those selected by others. The relative performance of countries on various item selections did vary somewhat, but generally not in a statistically significant manner.<sup>5</sup>

Comparing the diagonal element for a country with the overall average percent correct shows the difference between performance on the subset of items chosen as appropriate by the country and performance on the test as a whole. In general, there were only small increases in each country's performance on its own subset of items. To illustrate, the average percent correct for Singapore across all eighth-grade mathematics items was 71 percent. The diagonal element shows that Singaporean students had a slightly greater average percent correct (72 percent) across the set of items selected as appropriate for Singapore than they did overall. Almost all participants had a difference of one or two percentage points between the two performance measures, with the largest difference – four percent – for the Netherlands (55 percent compared with 59 percent).

It is clear that the selection of items does not have a major effect on the general relationship among countries. Countries that had relatively high or low performance across all the mathematics items also had relatively high or low performance on each of the various sets of

5 Small differences in performance shown in this exhibit are not statistically significant. The standard errors for the estimated average percent correct statistics are in Exhibit C.2. It can be said with 95 percent confidence that the value for the entire population falls between the sample estimate plus or minus two standard errors.

Exhibit C.2: Standard Errors for the Test-Curriculum Matching Analysis – Mathematics



Instructions: Read **across** the row to compare that country's performance based on the test items included by each of the countries across the top. Read **down** the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the **diagonal** to compare performance for each different country based on its own decisions about the test items to include.

Countries	Average Percent Correct on All Items	Singapore					Korea, Rep. of					Hong Kong, SAR					Chinese Taipei					Japan					Belgium (Flemish)					Netherlands					Hungary					Estonia					Russian Federation					Slovak Republic					Latvia					Australia					Malaysia					United States					Lithuania					Sweden					Scotland					England					Israel					New Zealand					Slovenia					Italy					Romania					Serbia				
		Singapore	Korea, Rep. of	Hong Kong, SAR	Chinese Taipei	Japan	Belgium (Flemish)	Netherlands	Hungary	Estonia	Russian Federation	Slovak Republic	Latvia	Australia	Malaysia	United States	Lithuania	Sweden	Scotland	England	Israel	New Zealand	Slovenia	Italy	Romania	Serbia	Singapore	Korea, Rep. of	Hong Kong, SAR	Chinese Taipei	Japan	Belgium (Flemish)	Netherlands	Hungary	Estonia	Russian Federation	Slovak Republic	Latvia	Australia	Malaysia	United States	Lithuania	Sweden	Scotland	England	Israel	New Zealand	Slovenia	Italy	Romania	Serbia																																																																											
Singapore	71 (0.9)	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9																																																															
Korea, Rep. of	68 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4																																																																					
Hong Kong, SAR	67 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8																																																																											
Chinese Taipei	66 (1.0)	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0																																																																											
Japan	64 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5																																																																											
Belgium (Flemish)	56 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7																																																																											
Netherlands	55 (1.0)	1.0	1.0	1.1	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0																																																																											
Hungary	55 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8																																																																											
Estonia	54 (0.8)	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8																																																																																	
Russian Federation	49 (0.9)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9																																																																																	
Slovak Republic	49 (0.8)	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8																																																																																	
Latvia	48 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8																																																																																	
Australia	48 (1.1)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1																																																																																	
Malaysia	48 (1.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0																																																																																	
United States	48 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8																																																																																	
Lithuania	47 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6																																																																																	
Sweden	47 (0.7)	0.6	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7																																																																																	
Scotland	46 (1.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0																																																																																	
England	46 (1.2)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2																																																																																	
Israel	46 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8																																																																																	
New Zealand	45 (1.3)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3																																																																																	
Slovenia	44 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6																																																																																	
Italy	43 (0.7)	0.8	0.7	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7																																																																																	
Romania	42 (1.1)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1																																																																																	
Serbia	41 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6																																																																																	
Bulgaria	41 (0.9)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9																																																																																	
Armenia	39 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7																																																																																	
Cyprus	37 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.																																																																																							



Exhibit C.2: Standard Errors for the Test-Curriculum Matching Analysis – Mathematics

Instructions: Read **across** the row to compare that country's performance based on the test items included by each of the countries across the top. Read **down** the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the **diagonal** to compare performance for each different country based on its own decisions about the test items to include.

Bulgaria	Armenia	Cyprus	Moldova, Rep. of	Norway	Macedonia, Rep. of	Lebanon	Jordan	Indonesia	Egypt	Iran, Islamic Rep. of	Bahrain	Tunisia	Chile	Palestinian Nat'l Auth.	Philippines	Morocco	Botswana	Saudi Arabia	South Africa	Ghana	Basque Country, Spain	Indiana State, US	Ontario Province, Can.	Quebec Province, Can.	Average Percent Correct on All Items	Countries
1.0	0.9	0.9	0.9	0.9	1.0	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	71 (0.9)	Singapore
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	68 (0.4)	Korea, Rep. of
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	67 (0.8)	Hong Kong, SAR
1.0	1.0	1.1	1.0	1.0	1.1	1.0	1.1	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.1	1.1	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	66 (1.0)	Chinese Taipei
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	64 (0.5)	Japan
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	56 (0.7)	Belgium (Flemish)
1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	55 (1.0)	Netherlands
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	55 (0.8)	Hungary
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	54 (0.8)	Estonia
0.9	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	49 (0.9)	Russian Federation
0.9	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	49 (0.8)	Slovak Republic
0.7	0.8	0.8	0.8	0.7	0.7	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	48 (0.8)	Latvia
1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1	1.1	48 (1.1)	Australia
1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.1	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	48 (1.0)	Malaysia
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	48 (0.8)	United States
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	47 (0.6)	Lithuania
0.7	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.6	0.7	0.7	0.6	0.7	0.7	0.7	0.6	0.7	0.6	0.7	0.6	0.7	47 (0.7)	Sweden
1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	46 (1.0)	Scotland
1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	46 (1.2)	England
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	46 (0.8)	Israel
1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	45 (1.3)	New Zealand
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	44 (0.6)	Slovenia
0.8	0.7	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.8	0.7	0.8	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.8	0.8	0.7	0.7	0.8	0.8	43 (0.7)	Italy
1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1	1.1	42 (1.1)	Romania
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	41 (0.6)	Serbia
0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	0.9	0.9	0.9	41 (0.9)	Bulgaria
0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.7	0.7	39 (0.7)	Armenia
0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	37 (0.3)	Cyprus
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	37 (0.8)	Moldova, Rep. of
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	37 (0.5)	Norway
0.6	0.7	0.6	0.7	0.7	0.7	0.6	0.7	0.6	0.7	0.6	0.7	0.6	0.7	0.6	0.7	0.6	0.7	0.6	0.7	0.6	0.7	0.6	0.7	0.7	33 (0.6)	Macedonia, Rep. of
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	32 (0.6)	Lebanon
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	31 (0.7)	Jordan
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	29 (0.7)	Indonesia
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	28 (0.5)	Egypt
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	28 (0.4)	Iran, Islamic Rep. of
0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.3	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.3	27 (0.2)	Bahrain
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	27 (0.4)	Tunisia
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	27 (0.5)	Chile
0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.5	26 (0.4)	Palestinian Nat'l Auth.
0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	25 (0.8)	Philippines
0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	25 (0.4)	Morocco
0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.4	0.3	0.4	23 (0.3)	Botswana
0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.4	0.4	0.3	0.4	0.4	0.3	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.4	19 (0.3)	Saudi Arabia
0.6	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	17 (0.7)	South Africa
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	15 (0.4)	Ghana
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	International Avg.	
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	43 (0.7)	Basque Country, Spain
1.3	1.3	1.4	1.3	1.3	1.4	1.3	1.3	1.3	1.3	1.4	1.3	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	47 (1.3)	Indiana State, US
0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.7	0.8	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	52 (0.7)	Ontario Province, Can.
0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	57 (0.9)	Quebec Province, Can.
196	209	197	209	188	174	189	152	209	192	203	199	162	164	207	192	198	184	213	128	151	210	206	195	201	213	Number of Items (Score Points) Identified*

\* Of the 194 items in the Mathematics test, some extended-response items were scored on a two-point scale, resulting in 215 total score points. Following item review, response categories were combined for a number of items, resulting in 213 score points.

( ) Standard errors

Exhibit C.2: Standard Errors for the Test-Curriculum Matching Analysis – Mathematics



Instructions: Read **across** the row to compare that country's performance based on the test items included by each of the countries across the top. Read **down** the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the **diagonal** to compare performance for each different country based on its own decisions about the test items to include.

Countries	Average Percent Correct on All Items	Singapore					Hong Kong, SAR					Japan					Chinese Taipei					Belgium (Flemish)					Netherlands					Lithuania					Latvia					England					Russian Federation					Hungary					United States					Cyprus					Moldova, Rep. of					Italy					Australia					New Zealand					Scotland					Slovenia					Norway					Armenia					Iran, Islamic Rep. of					Philippines					Morocco					Tunisia					Indiana State, US					Ontario Province, Can.					Quebec Province, Can.				
		Singapore	Hong Kong, SAR	Japan	Chinese Taipei	Belgium (Flemish)	Netherlands	Lithuania	Latvia	England	Russian Federation	Hungary	United States	Cyprus	Moldova, Rep. of	Italy	Australia	New Zealand	Scotland	Slovenia	Norway	Armenia	Iran, Islamic Rep. of	Philippines	Morocco	Tunisia	Indiana State, US	Ontario Province, Can.	Quebec Province, Can.																																																																																																																
Singapore	74 (1.2)	1.2	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.2	1.1	1.2	1.2	1.1	1.2	1.1	1.2	1.2	1.1	1.2	1.1	1.2	1.2	1.1	1.2	1.1	1.2	1.1	1.2																																																																																																
Hong Kong, SAR	70 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7																																																																																																
Japan	69 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4																																																																																																
Chinese Taipei	69 (0.5)	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4	0.5																																																																																																					
Belgium (Flemish)	65 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.5																																																																																																					
Netherlands	62 (0.5)	0.5	0.6	0.6	0.6	0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.5	0.6																																																																																																					
Lithuania	62 (0.6)	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7																																																																																																					
Latvia	61 (0.7)	0.7	0.7	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.8	0.7	0.8	0.7	0.7	0.8	0.7	0.8	0.7	0.7	0.8																																																																																																					
England	61 (0.8)	0.8	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.9	0.8	0.8	0.9	0.8	0.9	0.8	0.8	0.9	0.8	0.9	0.8	0.8	0.9																																																																																																					
Russian Federation	60 (1.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0																																																																																																					
Hungary	60 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7																																																																																																					
United States	58 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6																																																																																																					
Cyprus	57 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5																																																																																																					
Moldova, Rep. of	54 (1.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0																																																																																																					
Italy	54 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8																																																																																																					
Australia	53 (0.9)	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9																																																																																																					
New Zealand	52 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5																																																																																																					
Scotland	51 (0.8)	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.8	0.8	0.7	0.8	0.7	0.8	0.8	0.7	0.8	0.7	0.8	0.8	0.8	0.8																																																																																																					
Slovenia	48 (0.5)	0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6																																																																																																					
Norway	43 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5																																																																																																					
Armenia	42 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7																																																																																																					
Iran, Islamic Rep. of	32 (0.6)	0.6	0.7	0.6	0.7	0.7	0.7	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.7	0.7	0.6	0.7	0.6	0.7	0.7	0.6	0.7	0.6	0.7	0.7																																																																																																					
Philippines	29 (1.4)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.4	1.4	1.5																																																																																																					
Morocco	25 (0.7)	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.8	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7																																																																																																					
Tunisia	24 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.8	0.7	0.7	0.8	0.7	0.8	0.7	0.7	0.8	0.7	0.8	0.7	0.7	0.7																																																																																																					
International Avg.	53 (0.2)	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2																																																																																																					
<b>Benchmarking Participants</b>																																																																																																																																													
Indiana State, US	61 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7																																																																																																					
Ontario Province, Can.	56 (0.9)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9																																																																																																					
Quebec Province, Can.	55 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6																																																																																																					
Number of Items (Score Points) Identified*	166	151	116	131	117	144	138	164	164	161	95	160	164	159	164	138	157	138	139	145	150	164	135	91	152	85	149	136	143																																																																																																																

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

\* Of the 161 items in the Mathematics test, some extended-response items were scored on a two-point scale, resulting in 169 total score points. Following item review, some items were deleted and response categories were combined for a number of items, resulting in 159 items and 166 score points.

( ) Standard errors for the average percent of correct responses on all items appear in parentheses. The matrix contains standard errors corresponding to the average percent correct responses based on TCMA subset of items, as displayed in Table C.1.

items selected for the TCMA. For example, at the eighth grade, Singapore had the highest average percent correct on the test as a whole and on all of the different item selections, with Korea, Hong Kong SAR, and Chinese Taipei next in order of performance on practically all selections of items. Although there are some changes in the ordering of countries based on the items selected for the TCMA, most of these differences are within the boundaries of sampling error. As an example, consider the 197 score points selected by Cyprus. The students in Cyprus did a little better on these items than on the test as a whole, with 38 percent correct on these items, on average, compared with 37 percent correct on all items. However, most other countries also did better on these particular items, with an international average of 41 percent correct on the items selected by Cyprus. All 31 participants that performed better than Cyprus on the overall test also performed better on the items selected by Cyprus.

The TCMA results provide evidence that the TIMSS 2003 mathematics test provides a reasonable basis for comparing achievement of the participating countries and benchmarking entities. This result is not unexpected, since making the test as fair as possible was a major consideration in test development. The fact that the majority of countries indicated that most items were appropriate for their students means that the different average percent correct estimates were based on essentially the same items. Insofar as countries rejected items that would be difficult for their students, these items tended to be difficult for students in other countries as well. The analysis shows that omitting such items tends to improve the results for that country, but also tends to improve the results for all other countries, so that the overall pattern of results is largely unaffected.