Lessons for improvement from international comparative studies

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Abstract

Results from international comparative studies of student achievement provide perspectives on potentials for improving learning outcomes among Australian students. Two of the important international comparative studies are the Organisation for Economic Cooperation and Development (OECD) Programme for International Student Achievement (PISA) and the Trends in International Mathematics and Science Study (TIMSS) conducted by the International Association for the Evaluation of Educational Achievement (IEA). This paper focuses on reading and mathematics achievement.

Features of PISA and TIMSS

PISA and TIMSS allow students' performances to be compared across countries, over time, among jurisdictions within Australia and between groups of students. PISA and TIMSS have much in common, but they provide complementary information about student achievement. Both studies are based on carefully developed assessment frameworks that define what is assessed. They are based on sound reliable instruments that measure accurately what they were designed to measure. Both are designed to assess changes in student achievement over time by including common items that provide links across successive assessment cycles. Both make use of item response theory (albeit with different variants) as the basis for their analysis.

There is a difference in the focus of the assessments that are employed. PISA asks how well 15-year-old students are able to apply understandings and skills in reading, mathematics and science to everyday situations. TIMSS, on the other hand, looks at how well Year 4 and Year 8 students have mastered the factual and procedural knowledge taught in school mathematics and science curricula. PISA and TIMSS also differ in some important design features. PISA defines the population of interest to be 15-year-old students in school, whereas TIMSS defines its populations of interest to be students in Grades (Years)[1] 4 and 8. This difference is important for comparisons of results among countries and among jurisdictions within Australia. PISA has been conducted every three years since 2000 with one of the domains (reading, mathematics or science) being the major domain in turn for each cycle so that, for example, reading was the major domain in 2000 and in 2009 (Lokan, Greenwood, & Cresswell, 2001; Thomson. De Bortoli, Nicholas, Hillman, & Buckley, 2011). TIMSS has been conducted every four years since 1995 with mathematics and science having equal weight in each cycle.

Achievement in reading literacy in PISA 2009 and 2000

Reading in PISA 2009: International comparisons

On the basis of the PISA results for 2009 (see Table 1) it can be inferred that Australian 15-year-olds perform moderately well (on average) in reading literacy. Australian 15-year-olds performed similarly to their peers from New Zealand, Japan and Netherlands, but significantly less well than 15-year-olds form Korea, Finland, Singapore, Hong Kong and

[1] In international studies the term Grades is used whereas in Australia Years is used.

Canada (as well as the city of Shanghai) (Thomson. De Bortoli, Nicholas, Hillman, & Buckley, 2011, p. 52). The average score for Australian students in reading literacy was 515 scale points compared to the OECD average of 493 points on a scale where the OECD average standard deviation is 100 points (OECD, 2010a).

Table 1 also indicates the spread of student scores by the difference between the 10th and 90th percentile. In the case of Australia this difference was 254 points in 2009 compared to the OECD average of 241 points. In other words, Australia has a significantly wider spread of scores than for the OECD average. Among OECD countries Australia has a spread of scores that is significantly lower than only Israel, France and Luxembourg. Its spread is not different from a group of 13 other countries with spreads from 241 to 266, which include New Zealand, Sweden, the United States of America and the United Kingdom. Its spread is greater than 17 countries including Norway, Denmark, Canada, Finland and Korea that have spreads ranging from 239 to 200.

Changes in reading achievement in Australia from PISA 2000 to PISA 2009

Between 2000 and 2009 the average achievement in reading literacy for Australia declined from 528 to 515 a difference that is small but statistically significant. Over that same period, there was no significant change in the range of reading literacy scores for Australia. Other countries to record a significant decline included Ireland, Sweden, the Czech Republic, Spain, Finland, France and Iceland. Seven countries recorded a significant improvement (with gains of 13 to 40 scale points) in mean reading scores (OECD, 2010b).

Over the period from 2000 to 2009 there was no change in the relative performance of females and males or between Indigenous and non-Indigenous or students in metropolitan and non-metropolitan locations (see Table 2) (Thomson et al., 2011). Nor was there any change in the strength of the relationship of achievement with socioeconomic and cultural background. There was a small change in the difference in reading scores between students whose home language was English and those whose home language was a language other than English. This arose as a result of a decline in the achievement of the former group while there was no change in the achievement of the latter group.

There did appear to be a decline in the percentage of students in proficiency level 5 and above (18% in 2000 compared to 13% in 2009), but no significant change in the percentage of students below level 2 (13% in 2000 compared to 14% in 2009) (OECD, 2010b). The significantly larger drop in the percentage in the upper proficiency levels compared to the lack of change in the bottom proficiency levels indicates that in addition to a general shift of the distribution to the left there has been a small change in the shape of the distribution.

There were differences among jurisdictions in the change in mean reading scores between 2000 and 2009. In Tasmania (31 points), South Australia (31 points), New South Wales (23 points) and the ACT (21 points) there were significant declines. There were no significant changes in Western Australia, the Northern Territory, Victoria or Queensland (Thomson et al., 2011).

Changes in students' reading activities

PISA provides data on students' reports of their engagement in reading for enjoyment using responses to the same questions in 2000 as in 2009 (OECD, 2010b). The amount of time spent reading for enjoyment, and how much students enjoy reading, is positively associated with reading achievement. This relationship applies to both males and females, but the gap between males and females is smaller when reading for enjoyment is more frequent (Thomson et al., 2011). Between 2000 and 2009 there was a decline in the percentage of Australian 15-year-old students who read for enjoyment on a daily basis, for at least some time, from 67 per cent to 63 per cent. The decline was from 60 per cent to 53 per cent among males and was not statistically significant among girls. However, this change was evident in 22 other countries, many of which experienced no significant decline in reading achievement scores.

Achievement in mathematical literacy in PISA 2009 and 2000

Mathematics in PISA 2009

On the basis of the PISA results for 2009 (see Table 3) it can be inferred that Australian 15-year-olds perform moderately well (on average) in mathematical literacy. Australian 15-year-olds performed similarly to their peers from New Zealand, Belgium, Germany and Estonia, but significantly less well than 15-year-olds from 12 participating countries (including six OECD countries: Korea, Finland, Switzerland, Japan, Canada and the Netherlands (Thomson et al., 2011, p. 52). The average score for Australian students in mathematical literacy was 514 scale points (± 5 points) compared to the OECD average of 496 points (± 1 point) on a scale where the OECD average standard deviation is 100 points. The spread of student scores in mathematical literacy for Australia, as indicated by the difference between the 10^{th} and 90^{th}

percentile, was 242 points, which is not significantly different from the OECD average of 237 points (OECD, 2010b).

Changes in mathematics achievement in Australia from PISA 2003 to PISA 2009

It was not until 2003 that mathematics literacy was a major domain in PISA and so trends are measured from that cycle onwards (OECD, 2004). Between 2003 and 2009 the average achievement in reading literacy for Australia declined from 524 to 514; a difference that is small but statistically significant. There was no change in the spread of mathematics scores (with the range from the 10^{th} to 90^{th} percentiles being 246 points in 2003) and 241 points in 2009. Other OECD countries to record a significant decline in mathematics scores from 2003 to 2009 were the Czech Republic (24 points), Ireland (16 points), Sweden (15 points), France (14 points), the Netherlands (12 points) and Denmark (11 points). OECD countries to record a significant increase over same period were Mexico (33 points), Turkey (22 points), Portugal (21 points), Greece (21 points), Italy (17 points) and Germany (10 points).

For 2003 where mathematical literacy was the major domain it was possible to consider the subscales of mathematical literacy. In that cycle Australian students did, relatively, a little better on the uncertainty subscale than on mathematical literacy overall and, relatively, a little less well on the quantity subscale than on mathematical literacy overall. Scores on the space and shape as well as the change and relationships subscales were almost the same as the overall mathematical literacy scores (Thomson, Cresswell & De Bortoli, 2004).

Over the period from 2003 to 2009 there was no change in the relative performance of females and males, Indigenous and non-Indigenous, students of different socioeconomic background or students in different geographic locations (see Table 4). There was a change in the difference in mathematics scores between students whose home language was English and those whose home language was a language other than English. This arose as a result of a decline in the achievement of the former group, while there was no significant change in the achievement of the latter group (Thomson et al., 2011).

As was observed for reading literacy, there did appear to be a decline in the percentage of students in mathematics proficiency level 5 and above (20% in 2003 compared to 16% in 2009), but no significant change in the percentage of students below level 2 (14% in 2003 compared to 16% in 2009). The larger drop in the percentage in the upper proficiency levels compared to the lack of change in the bottom proficiency levels indicates that there has been a small change in the shape of the distribution.

There were differences among jurisdictions in the change in mean mathematics scores between 2003 and 2009. In South Australia (26 points), the ACT (20 points), Western Australia (19 points) and New South Wales (14 points) there were significant declines. There were no significant changes in other jurisdictions (Thomson et al., 2011).

Achievement in mathematics in TIMSS

Mathematics achievement in 2006/7

In TIMSS Australian students perform comparatively less well on tests of mathematics knowledge than in PISA. At Year 4, 11 of the TIMSS countries in 2006/7 (including England and the United States of America) scored significantly higher than Australia, which performed at the same level as Denmark, Hungary and Italy (see Table 5). At Year 4 there was no significant difference between the mean score for females of 513 and that for males of 519. The international average between-student standard deviation for the scale was 100 points. Although there were differences among countries in the scores of males and females, on average there was no difference between females and males. Indigenous students had mean scores 91 points lower than that of non-Indigenous students. Students from metropolitan locations had mean scores 30 points greater than those from provincial locations (with remote students lower still) (Thomson, Wernert, Underwood, & Nicholas, 2008).

In mathematics at Grade 8 nine countries (including Korea, Singapore, Japan, England and the United States of America) achieved significantly higher mean mathematics scores than Australia and the TIMSS scale average. The Australian mean for Year 8 mathematics of 496 scale points was not significantly different from eight other countries (Lithuania, the Czech Republic, Slovenia, Armenia, Sweden, Malta, Scotland and Serbia), and was not significantly different from the international mean. At Year 8 males had a mean score for mathematics of 504, which was significantly higher than the mean of 488 for females. On average, across all countries the score for males was greater than that for females. However, interestingly, in 25 countries there was no significant difference between females and males, and females achieved significantly higher average scores than males in 16 countries (many of these being in the Middle East). Indigenous students had mean scores 70 points lower than that of non-Indigenous students. Students from metropolitan locations had mean scores not significantly different from students from provincial locations (but the scores of remote students were 30 points lower). Students whose parents had a university degree had a mean score of 546 points compared to students whose parents had not completed secondary school who had a mean score of 472 points (see Table 5).

Changes in mathematics achievement in 2006/7

For TIMSS mathematics it is possible to examine changes over a 12-year period since 1994/5 through 2002/3 to 2006/7. In Year 4 the mean TIMMS mathematics score for Australian students increased significantly by 22 scale points from 494 through 499 to 516 score points. Thus, the increase was mainly from 2003 to 2007. Eight countries showed an increase over this period of time (including England and the United States of America).

In Year 8 the mean TIMSS mathematics score for Australia declined by a statistically significant 13 points from 509 to 496 points in 2006/7. Five countries (including England, Korea and the United States of America) significant improvements between 1994/5 and 2006/7 and ten countries had lower scores in 2006/7 than in 1994/5 (Thomson et al., 2008).

Differences between PISA and TIMSS assessments

PISA and TIMSS adopt different population definitions and sampling strategies. PISA is based on 15-year-olds, whereas TIMSS is based on a Year level (Year 4 or Year 8). As a consequence, countries (and jurisdictions within countries) will have differing balances of Year levels represented in the sample of 15-year-olds in PISA depending on their age–grade distribution. Conversely, countries (and jurisdictions) will have different ages represented in their grade-based samples in TIMSS. Wu (2008) has shown that this has some effects on the differences in between-country comparisons based on these studies.

Furthermore, as a consequence of different mathematics assessment frameworks PISA and TIMSS have different balances of numbers of items across the mathematics sub-domains. Based on a careful analysis of the items in TIMSS 2006/7 and PISA 2006, Wu (2008) has shown that there is a much stronger representation of ‘data’ items in PISA mathematics than in TIMSS Grade 8 mathematics. Countries in which students perform well on data record relatively higher scores on PISA than on TIMSS (other things equal). There is no clear answer concerning what is the correct balance of items across domains, but it does mean that comparisons need to be informed by knowledge of assessment frameworks.

Conclusion

Much of the commentary about results from PISA and TIMSS have focused on patterns within each cycle at a point in time. My view is that as much, and possibly more, can be learned from studying changes between cycles as from studying high achieving countries. It does appear that there have been small declines in average achievements in lower secondary reading and mathematics over recent years and that these declines appear to apply uniformly across most groups of students. This means that most of the existing inequalities among groups of students have remained the same. It also appears that the extent of the decline is a little more marked among relatively high-achieving students than relatively low-achieving students. This suggests that improvement initiatives need to be broadly based. Other analyses from PISA suggest that approaches to learning (including the extent to which students learn to monitor their own learning) are associated with higher achievement.

The variations among Australian jurisdictions in the extent of the declines suggests that there may be some systemic factors associated with curricula, the availability of qualified teachers or school organisation that may be linked to the declines in achievement in the lower secondary years. It is also of interest that the pattern in primary schools (at least in mathematics) is one of a small improvement in performance.

Longitudinal studies based on PISA in Canada have indicated that achievement in reading and mathematics are powerful predictors (net of the influence of other correlated social and demographic factors) of continuing in education and succeeding in entering the labour force (OECD, 2010c). For that reason it is important to follow through any indication \ that achievement in those areas might be declining, even if it is only by a small amount.

References

Lokan, J., Greenwod, L., & Cresswell, J. (2001). *15-up and counting, reading writing and reasoning: How literate are Australia's students?*. Melbourne: ACER.

Organisation for Economic Cooperation and Development. (OECD). (2010a). *PISA 2009 Results: What students know and can do*. Paris: OECD.

Organisation for Economic Cooperation and Development (OECD). (2010b). *PISA 2009 Results: Learning trends*. Paris: OECD.

Organisation for Economic Cooperation and Development (OECD). (2010d). *Pathways to success: How knowledge and skills at age 15 shape future lives in Canada*: Paris: OECD.

Organisation for Economic Cooperation and Development (OECD). (2004). *Learning for tomorrow's world: First results from PISA 2003*. Paris: OECD.

Organisation for Economic Cooperation and Development (OECD). (2001). *Knowledge and skills for life: First results from PISA 2000*. Paris: OECD.

Thomson, S., Cresswell, J., & De Bortoli, L, (2004). *Facing the future: A focus on mathematical literacy among Australian 15-year-old students in PISA 2003*. Melbourne: ACER.

Thomson, S., De Bortoli, L, Nicholas, M., Hillman, K., & Buckley, S. (2011). *Challenges for Australian Education: Results from PISA 2009.* Melbourne: ACER.

Thomson, S., Wernert, N, Underwood, C., & Nicholas, M. (2008). *TIMSS 07: Taking a closer look at mathematics and science in Australia*. Melbourne: ACER.

Wu, M. (2008). *A comparison of PISA and TIMSS 2003 achievement results in mathematics.* Paper presented to the annual meeting of the American Educational Research Association, New York, April.

Table 1 OECD country-level PISA reading statistics for 2009 and 2000

Country	PISA Reading 2009			PISA Reading 2000			Score Diff	Range Diff
	Mean score	Std Error	Range	Mean score	Std. Error	Range		
Australia	515	2.3	254	528	3.5	262	**-13**	-8
Belgium	506	2.3	263	507	3.6	280	-1	**-17**
Canada	524	1.5	231	534	1.6	242	-10	**-11**
Chile	449	3.1	214	410	3.6	233	**40**	**-19**
Czech Republic	478	2.9	241	492	2.4	242	**-14**	-1
Denmark	495	2.1	216	497	2.4	250	-2	**-34**
Finland	536	2.3	223	546	2.6	225	**-10**	-2
France	496	3.4	272	505	2.7	238	**-9**	**34**
Germany	497	2.7	248	484	2.5	284	**13**	**-36**
Greece	483	4.3	246	474	5.0	253	9	-7
Hungary	494	3.2	236	480	4.0	244	**14**	-8
Iceland	500	1.4	248	507	1.5	238	-7	10
Ireland	496	3.0	238	527	3.2	240	**-31**	-2
Israel	474	3.6	289	452	8.5	282	**22**	7
Italy	486	1.6	246	487	2.9	233	-1	13
Japan	520	3.5	253	522	5.2	218	-2	**35**
Korea	539	3.5	200	525	2.4	175	14	**25**
Mexico	425	2.0	217	422	3.3	224	3	-7
New Zealand	521	2.4	266	529	2.8	279	-8	-13
Norway	503	2.6	237	505	2.8	267	-2	**-30**
Poland	500	2.6	231	479	4.5	260	**21**	**-29**
Portugal	489	3.1	226	470	4.5	255	**19**	**-29**
Spain	481	2.0	224	493	2.7	218	**-12**	6
Sweden	497	2.9	252	516	2.2	238	**-19**	14
Switzerland	501	2.4	243	494	4.3	266	7	-23
United States	500	3.7	253	504	7.1	273	-4	-20
OECD Average	496	0.5	241	496	0.8	247	1	6

Note*:*

Range is the difference between 10th and 90th percentiles

Data source: OECD (2010) PISA 2009 Results: Learning Trends. Paris, OECD

Table 2 PISA reading statistics for groups of Australian students in 2009 and 2000

	PISA 2009		PISA 2000		
	Mean	S.E.	Mean	S.E.	
Gender					
Females	533	2.6	546	4.7	
Males	496	2.9	513	4	*
Difference	**37**	3.1	**34**	5.4	
Indigenous status					
Non-Indigenous	518	2.2	531	3.4	*
Indigenous	436	6.3	448	5.8	
Difference	**82**	6.7	**83**	6.7	
Language background					
English language at home	518	2	535	3.6	*
LBOTE	509	8.9	504	7.5	
Difference	10	8.3	**31**	7.4	
Immigrant status					
Australian born	515	2.1	532	3.6	*
Immigrant background	524	5.8	520	6.7	
Difference	**-10**	5.8	12	6.6	
Location					
Metropolitan	521	2.9	535	4.8	*
Non-metropolitan	496	4	518	7	*
Difference (metro-non-metro)	**25**	5.1	**17**	8.8	
Educational, social and cultural status (ESCS)					
Top quarter	562	1.7			
Upper quarter	532	1.5			
Lower quarter	504	1.9			
Bottom quarter	471	2.1			
Difference (Top-Bottom)	**91**	2.7			
Slope of relationship with achievement	**46**	1.8	**47**	2.7	
Distribution in upper and lower proficiency levels					
Percentage in Level 5 and above	13	0.8	18	1.2	*
Percentage below level 2	14	0.6	13	0.9	
Difference	-1	1.0	**5**	1.5	*

Notes:

Differences between groups that are significant are shown in bold

Differences across cycles that are significant are designated with a *

Table 3 OECD country-level PISA mathematics statistics for 2009 and 2003

Country	PISA Mathematics 2009 Mean score	PISA Mathematics 2009 Std Error	PISA Mathematics 2009 Range	PISA Mathematics 2003 Mean score	PISA Mathematics 2003 Std. Error	PISA Mathematics 2003 Range	Score Diff	Range Diff
Australia	514	2.5	241	524	2.1	246	**-10**	-5
Belgium	515	2.3	273	529	2.3	284	**-14**	-11
Canada	527	1.6	224	532	1.8	225	-6	0
Czech Republic	493	2.8	241	516	3.5	249	**-24**	-8
Denmark	503	2.6	224	514	2.7	236	**-11**	-12
Finland	541	2.2	212	544	1.9	214	-4	-1
France	497	3.1	261	511	2.5	239	**-14**	22
Germany	513	2.9	257	503	3.3	269	**10**	-12
Greece	466	3.9	228	445	3.9	242	**21**	-14
Hungary	490	3.5	238	490	2.8	241	0	-3
Iceland	507	1.4	235	515	1.4	233	-8	2
Ireland	487	2.5	214	503	2.4	221	**-16**	-6
Italy	483	1.9	239	466	3.1	247	**17**	-8
Japan	529	3.3	242	534	4.0	258	-5	-16
Korea	546	4.0	229	542	3.2	236	4	-8
Luxembourg	489	1.2	253	493	1.0	239	-4	14
Mexico	419	1.8	203	385	3.6	221	**33**	-18
Netherlands	526	4.7	234	538	3.1	241	**-12**	-7
New Zealand	519	2.3	250	523	2.3	256	-4	-6
Norway	498	2.4	221	495	2.4	238	3	-16
Poland	495	2.8	229	490	2.5	231	5	-2
Portugal	487	2.9	238	466	3.4	228	**21**	10
Slovak Republic	497	3.1	245	498	3.3	241	-2	4
Spain	483	2.1	234	485	2.4	229	-2	5
Sweden	494	2.9	240	509	2.6	243	**-15**	-4
Switzerland	534	3.3	257	527	3.4	256	7	0
Turkey	445	4.4	243	423	6.7	260	**22**	-16
United States	487	3.6	238	483	2.9	251	5	-13
OECD Average	499	0.6	237	500	0.6	241	-1	-4

Note:

Range is the difference between 10th and 90th percentiles

Data source: OECD (2010) PISA 2009 Results: Learning trends. Paris, OECD

Table 4 PISA mathematics statistics for groups of Australian students in 2009 and 2003

	PISA 2009		PISA 2003		
	Mean	S.E.	Mean	S.E.	
Gender					
Females	509	2.8	515	2.9	
Males	519	3.0	526	3.2	
Difference	**-10**	4.1	**-11**	4.3	
Indigenous status					
Non-Indigenous	517	2.5	526	2.1	*
Indigenous	441	5.3	440	5.4	
Difference	**76**	5.9	**86**	5.8	
Language background					
English language at home	516	2.2	529	2	*
LBOTE	517	8.9	505	6.1	
Difference	-1	9.2	**24**	6.4	*
Immigrant status					
Australian born	511	2.5	527	2.1	*
First generation	526	3.3	522	4.7	
Overseas born	518	6.4	525	4.9	
Difference (AB-FG)	-15	4.1	5	5.1	*
Difference (AB-OB)	-7	7.2	2	6.8	
Location					
Metropolitan	520	3.1	528	2.5	*
Provincial	499	3.7	515	4.4	*
Remote	465	15.8	493	9.6	
Difference (metro-provincial)	**21**	4.8	13	5.1	
Difference (metro-remote)	**55**	16.2	**35**	10.6	
Educational, social and cultural status (ESCS)					
Top quarter	561	3.1	572	2.9	
Upper quarter	530	3.0	537	3.1	*
Lower quarter	503	2.5	513	2.3	
Bottom quarter	471	2.6	479	4.1	*
Difference (Top-Bottom)	**90**	4.0	**93**	5.0	
Slope of relationship with achievement					
Distribution in upper and lower proficiency levels					
Percentage in Level 5 and above	16	0.8	20	0.7	*
Percentage below level 2	16	0.6	14	0.7	
Difference	0	1.0	**6**	1.0	*

Notes:

Differences between groups that are significant are shown in bold

Differences across cycles that are significant are designated with a *

Table 5 TIMSS mathematics statistics for 2006/7

Grade 4 Mathematics			Grade 8 Mathematics		
Country	Mean	SE	Country	Mean	SE
Hong Kong SAR	607	3.6	Chinese Taipei	598	4.5
Singapore	599	3.7	Korea, Rep. of	597	2.7
Chinese Taipei	576	1.7	Singapore	593	3.8
Japan	568	2.1	Hong Kong SAR	572	5.8
Kazakhstan	549	7.1	Japan	570	2.4
Russian Federation	544	4.9	Hungary	517	3.5
England	541	2.9	England	513	4.8
Latvia	537	2.3	Russian Federation	512	4.1
Netherlands	535	2.1	United States	508	2.8
Lithuania	530	2.4	Lithuania	506	2.3
United States	529	2.4	Czech Republic	504	2.4
Germany	525	2.3	Slovenia	501	2.1
Denmark	523	2.4	TIMSS Scale Avg.	500	
Australia	516	3.5	Armenia	499	3.5
Hungary	510	3.5	Australia	496	3.9
Italy	507	3.1	Sweden	491	2.3
Austria	505	2	Malta	488	1.2
Sweden	503	2.5	Scotland	487	3.7
Slovenia	502	1.8	Serbia	486	3.3
TIMSS Scale Avg.	500		Italy	480	3
Armenia	500	4.3	Malaysia	474	5
Slovak Republic	496	4.5	Norway	469	2
Scotland	494	2.2	Cyprus	465	1.6
New Zealand	492	2.3	Bulgaria	464	5
Czech Republic	486	2.8	Israel	463	3.9
Norway	473	2.5	Ukraine	462	3.6
Ukraine	469	2.9	Romania	461	4.1
Georgia	438	4.2	Bosnia and Herzegovina	456	2.7
Iran	402	4.1	Lebanon	449	4
Algeria	378	5.2	Thailand	441	5
Colombia	355	5	Turkey	432	4.8
Morocco	341	4.7	Jordan	427	4.1
El Salvador	330	4.1	Tunisia	420	2.4
Tunisia	327	4.5	Georgia	410	5.9
Kuwait	316	3.6	Islamic Rep. of	403	4.1
Qatar	296	1.0	Bahrain	398	1.6
Yemen	224	6.0	Indonesia	397	3.8
			Syrian Arab Republic	395	3.8
			Egypt	391	3.6
			Algeria	387	2.1
			Morocco	381	3
			Colombia	380	3.6
			Oman	372	3.4
			Palestinian Nat'l Auth.	367	3.5
			Botswana	364	2.3
			Kuwait	354	2.3
			El Salvador	340	2.8
			Saudi Arabia	329	2.9
			Ghana	309	4.4
			Qatar	307	1.4