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Red Flags for Educators: Lessons for Canada in the PISA Results

There are three "red flags" for Canada in the latest PISA report on Canadian schools: 1) declining mathematics scores; 2) inferior reading scores for boys relative to girls; 3) mediocre scores for the six small provinces, in particular for Manitoba and Saskatchewan.

John Richards

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The Study In Brief

The Program for International Student Assessment (PISA) has deservedly become the benchmark for comparing national K-12 school systems. Since 2000, the OECD has, at three year intervals, organized PISA "rounds" to assess school system performance in member countries and in non-member partner countries, among upper-secondary students, age 15, in three core subjects.

This *Commentary* summarizes major conclusions relevant to Canada from the latest round, in 2015. The policy recommendation of this *Commentary* is implicit: educators, administrators and parents should make use of PISA results as a guide to strategic priorities for education policy.

Canada's overall PISA score has consistently ranked well above the OECD average on the three subjects assessed (reading, mathematics, and science). In 2015, Canada ranked 10th in mathematics, 3rd in reading, 7th in science. Overall, our school system is faring well. However, PISA provides ample evidence to prompt some humility among Canadians. To be more specific:

- *Trends in mathematics*: Since the inauguration of PISA, Canadian performance in mathematics has consistently declined from one round to the next, and the gap between 2003 and 2015 results is statistically significant.
- *Gender gaps*: Canada is not faring well on this dimension; it is close to the OECD average. There exist in Canada modest gender gaps in mathematics and science that favour boys. A much larger gender gap in reading favours girls.
- *Mediocre outcomes for the six small provinces, for Manitoba and Saskatchewan in particular*: From the base year for each subject to 2015, PISA score declines in all three subjects have been statistically significant for Manitoba and Saskatchewan. In all three subjects, the levels in these provinces are now below the benchmark year OECD average. There are reasons to speculate that the high proportion of Indigenous students in Manitoba and Saskatchewan is a key factor in explaining their PISA performance. Relative to these two Prairie provinces, outcomes are better in the four Atlantic provinces, but they, too, are not faring well. Each of the four has one 2015 score below 500; among the four, all scores are below the relevant national Canadian average.

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In an industrial age, whether a country educates its children well is perhaps the most important determinant of whether the next generation will be prosperous or poor, whether income inequality will be high or low. Good schools are not a panacea for avoiding all social ills, but weak schools are a guarantee of intergenerational problems.

The purpose of this *Commentary* is to introduce the Program for International Student Assessment (PISA) and summarize its major conclusions relevant to Canada. Since 2000, the OECD has organized PISA "rounds" to assess school-system performance in member countries and non-member partner countries for upper-secondary students, age 15, in three core subjects. The assumption underlying PISA is that a common denominator of good schools is the teaching of reading, mathematics and science. Obviously, schools have other important tasks, such as teaching literature and history, important subjects that must be tailored to specific countries. These are complements to, not substitutes for, performance in the three core subjects. The policy recommendation of this *Commentary* is implicit: educators, administrators and parents should make use of PISA results as a guide to strategic directions in education policy.

Due to the rigour of the background analytic reports prepared and its very large sample size, PISA has deservedly become the benchmark in making international comparisons of the outcomes of primary and secondary school systems. In rotation, each "round" (the survey is conducted once every three years) concentrates on one of the three subject areas. The most recent round, in 2015, emphasized science; it posed fewer questions on reading and mathematics.[1]

The quality of a country's school system is the result of myriad decisions made by politicians and educators – and by parents. Until the last quarter of the 20th century, the United States was ahead of most other industrial countries in realizing primary then secondary education for nearly all children, and finally realizing postsecondary education for the majority (Goldin and Katz 2010; Acemoglu and Autor, 2012). With varying degrees of academic rigour, many argue that, in terms of public-policy initiatives over the past 150 years, strategic decisions regarding the US education system are a major – perhaps *the* major – factor in explaining the country's economic success in the 20th century (Hanushek & Woessmann 2015; Putnam 2015).

There is no guarantee that a country can preserve its lead in education. For many reasons, over the past generation, the United States has lost its pre-eminence in basic K-12 education. In the 2015 PISA round, the overall US ranking among all participating countries (OECD members or not)

The author thanks Colin Busby, Robert McConnell, Graham Orpwood and anonymous reviewers for comments on earlier drafts. He retains responsibility for any errors and the views expressed.

1 Sampling was undertaken in the 35 OECD member countries, plus 35 other "partners." The worldwide sample comprised more than 500,000 students, the Canadian sample more than 30,000 students.

was 40th in mathematics, 24th in reading and 25th in science (OECD 2016a,19).[2] By contrast, Canada's PISA score has consistently ranked well above the OECD average on all three subjects assessed. In 2015, it was 10th in mathematics, third in reading and seventh in science. Overall, the Canadian school system is faring well.

However, PISA provides ample evidence to prompt some humility among Canadians. This *Commentary* emphasizes three dimensions along which average Canadian outcomes are unsatisfactory. To be more specific:

- *Trends in mathematics*: Since PISA's inauguration, overall Canadian performance in mathematics has consistently declined from one round to the next, and the gap between 2003 and 2015 results is statistically significant.
- *Gender gaps*: Canada is not faring well on this dimension; it is close to the OECD average. In Canada, there are modest gender gaps in mathematics and science that favour boys. A much larger gender gap in reading favours girls. A less well-known result is that, across OECD countries including Canada and for all three subjects, the gaps increasingly favour girls at lower percentiles of combined-gender student performance. The gap favouring boys in science and mathematics disappears at lower percentiles, and the gap favouring girls in reading expands.
- *Mediocre outcomes in the six small provinces, particularly Manitoba and Saskatchewan:* From the base year for each subject, PISA score declines in all three subjects have been statistically significant in Manitoba and Saskatchewan (see Table 1). In all three subjects, levels in these provinces are now below the benchmark year OECD average, set to 500.[3] It is misleading to label their education systems as faring well; they are average by OECD standards. There are reasons to speculate that the high proportion of Indigenous students in Manitoba and Saskatchewan is a key factor in explaining their PISA performance (see Appendix). Relative to these two Prairie provinces, outcomes are better in the four Atlantic provinces, but they too are not faring well. Each of the four has one 2015 score below 500; among the four, all scores are below the relevant national Canadian average.

Trends in Provincial School Systems

Since the launch of PISA, small declines in Canadian national scores in science and reading have not been statistically significant. On the other hand, declines in Canadian mathematics performance from 2003 to 2015 have been consistent and the cumulative decline is statistically significant.

If we consider 2015 provincial performance (relative to the base year for each subject), there exist several evident sources of concern beyond those in Manitoba and Saskatchewan mentioned above (see Table 1):

- In Newfoundland, the declines in science and mathematics are statistically significant, and the decline in reading is close to achieving significance.
- In Ontario, the decline in mathematics is statistically significant, and the decline in science is close to achieving significance.

2 The US mathematics score is significantly below the OECD average. US reading and science scores are not significantly different from the OECD average. The Canadian composite scores are above the respective OECD averages for all three subjects and the gaps are statistically significant.

3 The average OECD score for the respective benchmark years was set to 500, with a standard deviation of 100. To enable inter-round comparison of results, PISA maintains certain questions from the initial benchmarking round for use in subsequent rounds. The benchmarking of scoring for reading occurred at the time of the first round in 2000, for mathematics in 2003 and for science in 2006. Admittedly, only the mathematics scores in Manitoba and Saskatchewan are sufficiently below 500 for the gap to be statistically significant at the 5 percent level of significance.

Table 1: Average 2015 PISA Scores and Changes from Subject Benchmark Year to 2015, Canada and Provinces

	Science		Reading		Mathematics	
	Score	Change (2006-2015)	Score	Change (2000-2015)	Score	Change (2003-2015)
OECD average	*493*		*498*		*490*	
Canada	528	-6	527	-7	516	**-16**
Alberta	541	-9	533	-17	511	**-38**
British Columbia	539	0	536	-2	522	**-16**
Manitoba	499	**-24**	498	**-31**	489	**-39**
New Brunswick	506	0	505	4	493	**-19**
Newfoundland	506	**-20**	505	-12	486	**-31**
Nova Scotia	517	-3	517	-4	497	**-18**
Ontario	524	-13	527	-6	509	**-21**
Prince Edward Island	515	6	515	-2	499	-1
Quebec	537	6	532	-4	544	7
Saskatchewan	496	**-21**	496	**-33**	484	**-32**

Note: The changes measure the difference between 2015 comprehensive score and that in the benchmark year of the subject (2000 for reading, 2003 for mathematics and 2006 for science). The bolded changes are statistically significant, at a 5-percent significance level, based on reported standard errors of estimates for the benchmark year and 2015, plus the relevant "link error."

Sources: Author's calculations from OECD (2016a, Tables 1.6.3a,1.6.3b,1.6.3c,B2.1.66) and earlier PISA manuals.

- Alberta ranks first among provinces in science scores, but in mathematics, it has declined from being the highest-performing province in 2003 to a 2015 score below the Canadian average.
- Eight of 10 provinces display statistically significant declines in mathematics. The only exceptions are Quebec and Prince Edward Island. (Note, however, qualifications on the Quebec sample, discussed in Box 1.)

Gender Inequalities

One of the robust rules of thumb among school administrators, in Canada and other OECD countries, is that girls outperform boys in reading. PISA 2015 provides ample evidence to that effect. The mean gender difference in Canadian reading scores is 26 points in favour of girls. By much smaller margins, boys in Canada on average outperform girls in science and mathematics.[4]

A less widely discussed aspect of gender inequality is that the performance of boys becomes weaker relative to girls, in all three subjects, at lower percentiles of combined-gender student performance. In Canada overall, at the 90th percentile, the average reading gap favours girls by just 19 points; at the 10th percentile, it is almost double, 36 points. At the 90th percentile, the average mathematics gap favours boys by 16 points;

4 For national data on gender gaps see Tables B2.1.2 for science, B2.1.8 for reading, and B2.1.12 for mathematics (OECD 2016a).

Box 1: Potential PISA Bias

The accuracy of PISA results depends obviously on the attention paid to sound sampling procedures. Some researchers (e.g., Rudkowski & Rudkowski 2016) have expressed concern that public discussion pays too much attention to national rankings and ignores the sampling qualifications.

For preparation of the Canadian component of the 2015 PISA sample, the Council of Ministers of Education Canada (CMEC) assumed responsibility (O'Grady et al. 2016). Sampling entailed two stages: First, within each province, CMEC selected a random sample of schools (probability of selection weighted by school size); second, within the selected schools, CMEC selected a random sample of students age 15. Schools could exempt themselves, in which case replacement schools were substituted. Also, selected students could be excluded from the sample for several reasons (such as recent immigrants unable to understand French or English).

PISA requires that, in jurisdictions where the school response rate is below 85 percent, an analysis of non-response bias be undertaken. The school response rate after replacement was substantially below 85 percent in Quebec (52 percent), and below to a lesser degree in Ontario (82 percent) and Alberta (80 percent). The non-response analysis showed no potential bias in Ontario and Alberta, but did show a modest bias in Quebec in science scores (CMEC 2016, 49). Based on an analysis of socio-economic and school characteristics, students in the responding Quebec schools displayed higher science scores of approximately two to three points relative to students in non-responding schools.

at the 10th percentile, the advantage for boys is one point. Similarly, the average science gap favours boys by nine points at the 90th percentile; at the 10th percentile, there is a one-point advantage for girls.

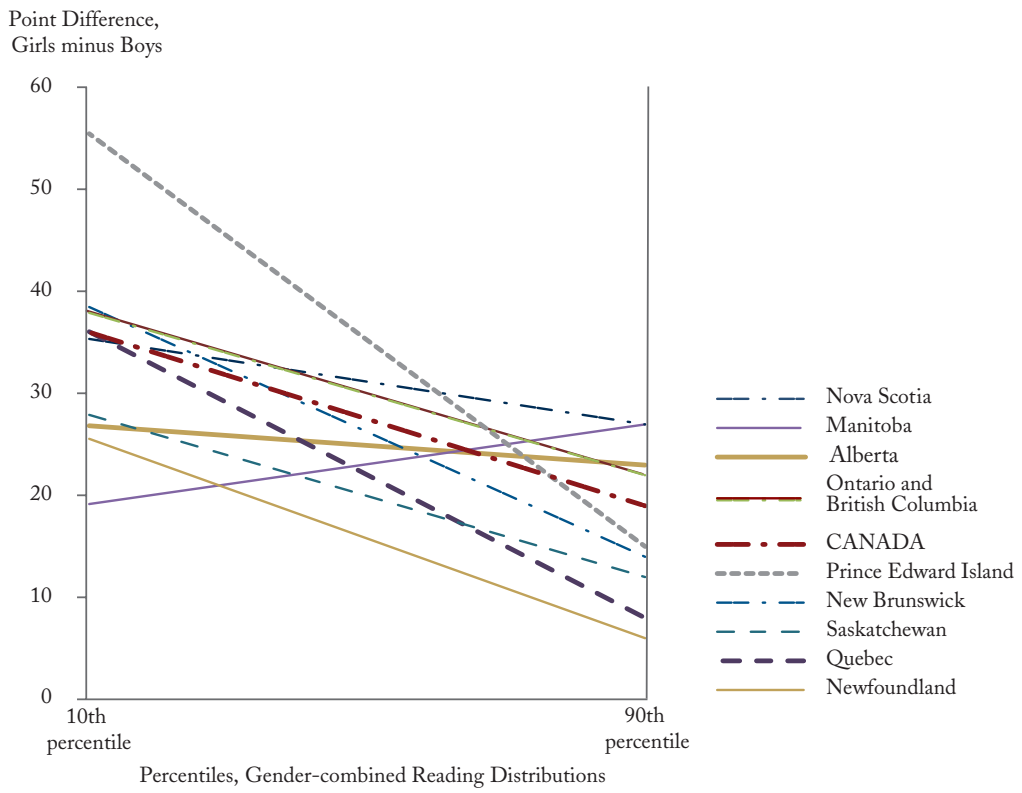
Figure 1 shows reading gaps in Canada and the provinces at the 10th and 90th percentiles of their combined-gender rankings. Above-average increases in the gap occur in Prince Edward Island, Quebec, New Brunswick and Newfoundland.[5]

Signalling the gender gap in reading as a concern does not imply that Canada fares worse on this dimension than elsewhere. In all OECD countries, girls outperform boys in reading scores and national gender gaps widen at lower percentile scores. The Canadian average (26 points in favour of girls) is very close to the overall OECD average.

What can be done about the gap? There is no silver bullet, but several options deserve attention, such as hiring more male teachers in language-based courses or experimenting with gender-separated classes (Tyre 2008; Rosin 2012).

5 Manitoba is an outlier. The proximate reason for the 10th-percentile reading gap being smaller than the comparable gap at the 90th percentile is that the Manitoba decline in girls' reading score from 90th to 10th percentile is the largest among the provinces and the decline among boys' reading score is less than the average decline among boys. The Manitoba boys' reading score at the 90th percentile is, however, the lowest among provinces; their reading score at the 10th percentile is second lowest.

Figure 1: Gender Gaps in Reading (girls' minus boys' score), Canada and Provinces, 10th and 90th Percentiles in Combined Reading Scores, 2015



Source: OECD (2016a,Tables 1.4.8a,B2.1.8).

Equity and Quality – at the International and Provincial Level

Undeniably, average education outcomes matter. But so, too, do outcomes at the top and bottom of the social hierarchy. In an oft-cited study of the role of education in economic development, Hanushek and Woessmann (2008) provide evidence that relatively strong school outcomes among both "low-status" and "high-status" students independently contribute to an explanation of economic growth. In this section, I briefly compare Canada and several other OECD countries in terms of performance at the "top" and "bottom," and do the same for the 10 provinces.

Education outcomes depend not just on schools but on families. On education's "supply side," measures of school quality (such as teacher training and experience, and principal leadership quality) matter. So, too, does the extent of support by families to their children's education success. On the "demand side," parental expectations for formal education matter, as do students' own expectations as they get older (Thiessen 2009). The distinction between the role of a student's school and family is fundamental.

In any population, students from high-status families (with high income and education levels) usually realize better education outcomes than low-status families. The former are better placed to supplement school-based teaching with personal help and private tutoring. Furthermore, families typically generate "external effects" on children of other families in the form of peer effects within schools (Hanushek & Rivkin 2006).

In a "good" school, with most children from high-status families, most children are faring well and these children tend to improve the performance of students who, in a "bad" school, would be expected to perform at a lower level. Conversely, in a "bad" school where most students are not performing well, students expected to perform well tend to perform less well.[6]

PISA surveys attempt to distinguish between the role of family and school by posing questions to sampled students about the occupational status and educational level of their parents, and about home possessions indicative of educational culture (for example, number of books in the family home). PISA does not gather income data for students' families.[7] From this information, PISA constructs a socio-economic index. (See Box 2 for more detail on the "economic social and cultural status" [ESCS] index.) Underlying Figures 2 and 3 is the PISA calculation, for each jurisdiction, of its average composite science score in each of four quarters, the quarters defined in terms of ascending ESCS scores. The quarter-specific average science scores are calculated for the OECD overall, for each member country, and for subnational jurisdictions in some countries (including Canada).

The trendline connecting the quarter-specific averages defines approximately a jurisdiction's "social gradient."[8] Not surprisingly, its slope is positive. If we anchor discussion on the top-quarter results, the slope can be interpreted as the extent to which schools, both private and public, offset what would otherwise be the decline in scores due to decline in ESCS scores: The flatter the slope, the more successful the offset.

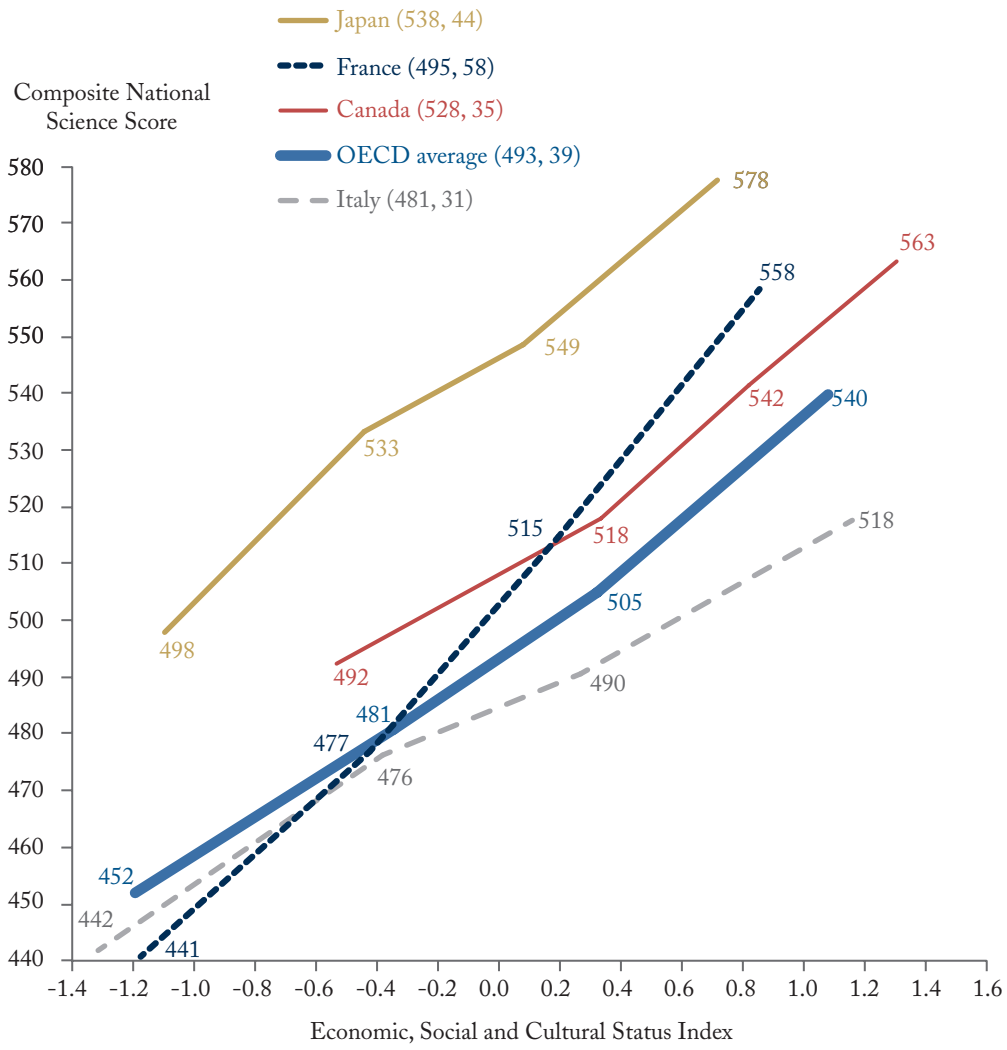
Ideally, a country should have a high average score and a shallow gradient slope. Figure 2 illustrates the gradient for the OECD overall and for four Group of Seven countries. The countries selected include Canada, Italy (which enjoys the flattest slope among G7 countries), France (the G7 country with the steepest slope), and Japan (the G7 country with the highest average science score). As to be expected given its overall PISA rank, Canada realizes above-average quarter-specific scores and a below-average gradient slope. Italy pays a high price in terms of average outcome for its superior equity: all four of its quarter-specific average scores are below the corresponding OECD average. France enjoys third- and top-quarter averages above comparable OECD scores; bottom and

6 In a related exercise, PISA (2016a, 412) estimates for each country the impact on composite science score of individual students' socio-economic index and of average index value of the schools they attend. For Canada, the estimate is that three-quarters of the index impact is due to variation in individuals' index values, one quarter to the peer effect, proxied by variation in schools' index values.

7 Gathering family income data is unrealistic given constraints of PISA surveys. While the absence of income weakens the strength of the ESCS index, in general, education of parents is more important than parental income in explaining family impact on children's education (Frenette 2007).

8 The social gradient is a measure of the incremental effect of the ESCS on student outcomes. The most rigorous methodology requires a multivariate regression, controlling for the impact of many explanatory factors other than the ESCS. A less rigorous methodology requires a univariate regression of individual student outcomes on their relevant ESCS index. The slope of the trendlines in Figure 3 approximates the univariate regression results.

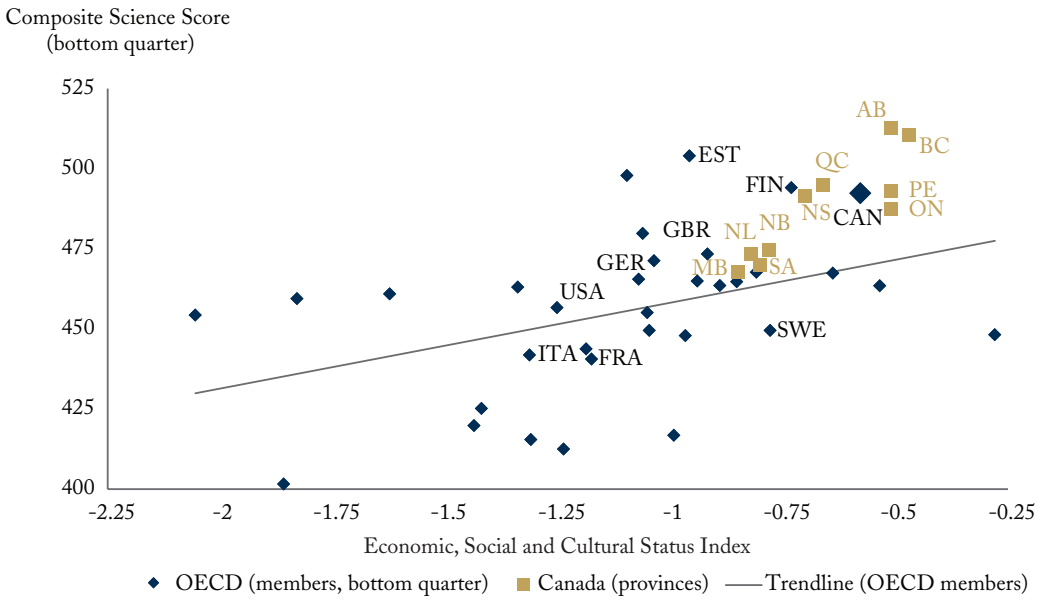
Figure 2: Social Gradients, OECD Average and Selected G7 Countries, 2015



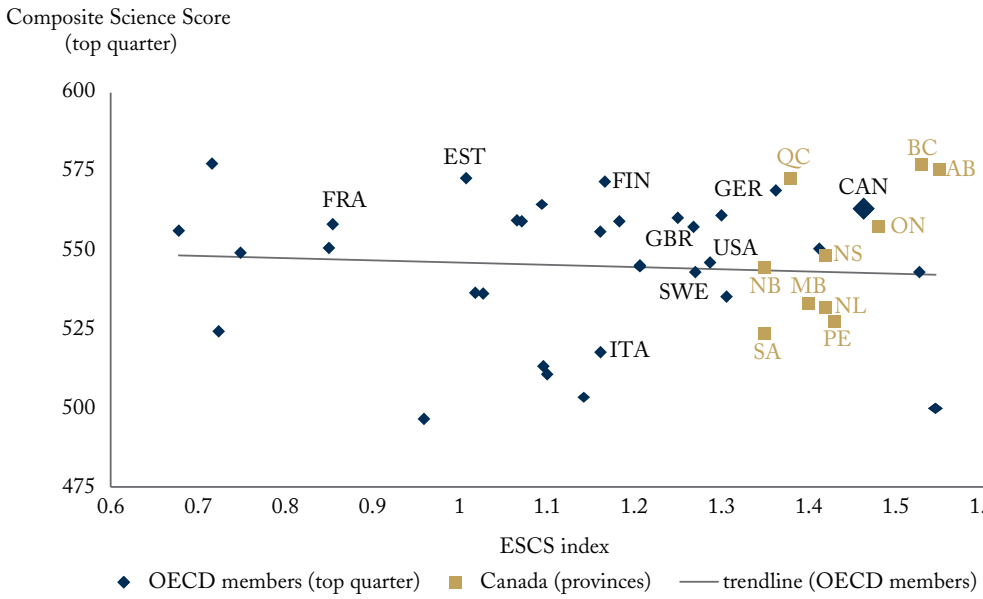
Note: Figures in parentheses in the legend are respectively the average 2015 composite science scores for the OECD and selected countries, and the slope of the social gradient. The slope is calculated using data points for the top and bottom quarters.

Figure 3: PISA 2015 Composite Science Scores by Quarter-Specific ESCS Index Values, OECD Member Countries and Canadian Provinces

Panel a: Bottom Quarter



Panel b: Top Quarter



Notes: a.Quarter-specific scores are identified for selected countries: United States (USA), Great Britain (GBR), France (FRA), Germany (GER), Italy (ITA), Sweden (SWE), Estonia (EST) and Finland (FIN).
b.The trendlines in Figure 3 are defined over all OECD member countries, with the exception of Turkey and Mexico, the two exceptionally low-income members.
Source: Author's calculations from (OECD 2016a,Tables1.6.2a,1.6.3a, B2.1.65, B2.1.66).

Box 2: Index of Economic Social and Cultural Status (ESCS)

Socio-economic status summarizes many different aspects of families' expected impact on student outcomes. The PISA index of economic, social and cultural status (ESCS) is derived from several variables related to students' family background: parents' education, parents' occupations, a number of home possessions used as proxies for material wealth, and the number of books and other educational resources available in the home. The index is a composite score derived from these indicators (via principal component analysis). It is constructed to be internationally comparable. For the first time, in PISA 2015, construction of the index was run across equally weighted countries, including OECD and partner countries/economies. Thus, all countries and economies contribute equally to ESCS scores. However, for the purpose of reporting, the values of the ESCS scale are normalized to have a mean of zero and a standard deviation of one for the population of students in OECD countries, with each country given equal weight.

Table 2: Gaps between Provincial and Canadian Composite Science Scores, by Ascending Quarters defined by the ESCS* Index

	Bottom	Second	Third	Top
Canada (quarter-specific level)	*492*	*518*	*542*	*563*
Alberta	**20**	10	9	12
British Columbia	**18**	3	11	14
Manitoba	**-25**	**-24**	**-34**	**-30**
New Brunswick	-18	**-19**	**-33**	**-19**
Newfoundland	**-19**	**-16**	**-21**	**-31**
Nova Scotia	-1	-9	-9	**-15**
Ontario	-5	0	-2	-6
Prince Edward Island	1	-3	**-16**	**-36**
Quebec	3	11	11	9
Saskatchewan	**-23**	**-24**	**-45**	**-40**

*: Economic, Social and Cultural Status Index.

Note: The bolded changes are statistically significant from 0, at a 5 percent level, based on reported standard errors of the 2015 estimates.

Sources: Author's calculations from OECD (2016a, Tables 1.6.3a,1.6.3b,1.6.3c,B2.1.66) and earlier PISA manuals.

second-quarter averages, however, are below OECD scores.[9] Japan achieves an enviable average national score, second only to Singapore; its gradient is, however, somewhat above the OECD average.

Figure 3 includes Canadian provincial outcomes. Each panel illustrates quarter-specific average science outcomes by respective ESCS averages, among OECD countries and the 10 Canadian provinces: bottom quarter (panel a) and top quarter (panel b).[10] In each panel, the trendline illustrates the average international impact on science performance attributable to ESCS quarter-specific average scores. Countries and provinces that fall above the line perform above the projection based on ESCS level.

The trendline in Figure 3 (panel a) indicates that ESCS scores play a significant role in explaining bottom-quarter performance. While Canadian overall performance in this quarter is well above what we should expect given the trendline projection, for four provinces (Manitoba, Saskatchewan, Newfoundland, and New Brunswick) performance lies close to projection. Another four provinces (Quebec, Ontario, Nova Scotia, and Prince Edward Island) realize, in this quarter, a performance similar to the national average. The final two provinces (Alberta and BC) perform above the Canadian level. (See also Table 2.)

The implication of the flat ESCS trendline in Figure 3 (panel b) is that whatever factors explain differences in top-quarter scores, family-specific factors incorporated in the ESCS index are not the explanation. Among provinces, top-quarter science performance in Quebec, British Columbia and Alberta is similar to the best-performing OECD countries. Given its large share of the Canadian population, Ontario's score is inevitably close to the national score. New Brunswick and Nova Scotia achieve scores close to the OECD top-quarter average (545); the four remaining provinces (Manitoba, Saskatchewan, PEI and Newfoundland) score well below the OECD top-quarter average.

The overall conclusion from this exercise is that the provinces are performing better, relative to other OECD countries, at the bottom than at the top quarter. At the bottom quarter, Canada and all provinces perform at or above the projected average based on national ESCS scores. In the top quarter, however, four of the six small provinces (Saskatchewan, Manitoba, Prince Edward Island, and Newfoundland) perform below the OECD top-quarter average; the two others (Nova Scotia and New Brunswick) lie just above it.

Conclusion

While the Canadian K-12 school system is faring well overall, there exist reasons for humility. The implicit policy recommendation of this *Commentary* is that educators, administrators and parents make use of PISA results as a guide to strategic directions in education policy. Canada is experiencing a troubling decline in mathematics performance and a serious gender gap in reading. And the education systems in the six small provinces, Manitoba and Saskatchewan in particular, are not faring well.

9 PISA results played a role in the recent French presidential election. The exceptionally steep slope and below-average score in the bottom quarter prompted discussion among the candidates. Among the first initiatives of the newly elected president has been to halve class size in targeted low-income neighbourhoods.

10 Two OECD member countries, Turkey and Mexico, have exceptionally low incomes and have been excluded.

APPENDIX

The Role of Indigenous Education Outcomes in Manitoba and Saskatchewan

In these two provinces, the statistically significant declines over the past decade in PISA outcomes in all three subjects and their mediocre average scores (recall Table 1) should prompt provincial education authorities to undertake urgent remedial action.

Almost certainly, a major factor underlying Manitoba and Saskatchewan PISA outcomes is their share of Indigenous students. If their participation in PISA is similar to results of the 2011 National Household Survey, about 25 percent of students who wrote the 2015 PISA test in these provinces are Indigenous. The comparable statistic elsewhere in Canada is about 5 percent (Table A1, column 5).[11] Unfortunately, there are no publicly available Manitoba and Saskatchewan core-competency results of Indigenous and non-indigenous student outcomes from which to infer PISA outcomes.

A powerful predictor of subsequent failure to complete secondary studies is weak student outcomes on core competency tests (Anderson & Richards 2016). The census evidence of high-school completion among young adults indicates exceptionally low First Nations completion rates in Manitoba and Saskatchewan (Table A1, columns 6 – 8). By backward inference, Indigenous student PISA outcomes are probably weaker than Indigenous outcomes in other provinces.[12]

The causes for low Indigenous education outcomes are complex. History matters: The residential school experience has reinforced reluctance among many First Nations leaders to place a high priority on formal education success (Canada 2003). First Nations communities enjoy a treaty right to control education for on-reserve children, and Ottawa has an obligation to finance it. Once off-reserve, the responsibility for First Nations education resides with the relevant province. This division of responsibility complicates delivery of services and often generates political controversy, which in turn confounds efficient delivery of education services (Graham 2012).

Provision of school services in remote communities is costly and, despite higher rural than urban per-student spending, rural schools often lack specialized services available in urban schools (Richards & Scott 2009). Among rural families, native or not, rural education outcomes suffer relative to urban outcomes (Carr 2010). Whereas First Nations families (especially "registered Indians" pursuant to the Indian Act) are disproportionately rural, Métis are nearly as urbanized as the non-indigenous population

11 No on-reserve schools figure among the schools sampled for inclusion in PISA testing. However, approximately two-thirds of Indigenous families live off-reserve and most children living on-reserve and attending a secondary school do so in a provincial school (Richards 2014).

12 Two reports prepared by the CMEC (CMEC 2012; O'Grady & Houme 2015) provide evidence at the national level of composite national performance of Indigenous students at Grade 8 in mathematics (First Nations 453, Métis 467) and science (First Nations 449, Métis 472). Comparable non-indigenous statistics are mathematics (507) and science (503). These results imply that Indigenous outcomes are approximately 90 percent of non-indigenous outcomes. If we apply this ratio to Indigenous/non-indigenous PISA scores, assume Indigenous students in Manitoba comprise 25 percent of the total and the composite PISA science score is 499, then the non-indigenous Manitoba score is 512, Indigenous 461. The very low high-school completion rates in Manitoba and Saskatchewan suggest that their Indigenous PISA outcomes may well be considerably less than 90 percent of non-indigenous results.

Table A1: Manitoba and Saskatchewan, Selected Statistics, 2011

	Elements of Community Well-Being Index			
	Income	Education	Housing	Labour Market
	(Index Value: Range [0 – 100])			
	1	2	3	4
	First Nation Communities			
Manitoba (n=59)	42.4	24.0	54.6	62.6
Saskatchewan (n=77)	46.9	33.6	59.8	61.8
Other Provinces/Territories (n=467)	65.0	37.3	72.0	71.0
	Non-indigenous Communities			
Manitoba (n=126)	84.3	54.4	93.6	89.5
Saskatchewan (n=343)	81.6	53.7	91.7	89.5
Other Provinces/Territories (n=2257)	84.3	54.4	94.3	83.6
	School Age Cohort (5 – 14), Indigenous share	**Young adults (ages 20 – 24) with high school certification or more, share among…**		
		First Nation	**Métis**	**Non-indigenous**
	(percent)			
	5	6	7	8
Manitoba	26.6	42.6	81.8	89.8
Saskatchewan	26.3	50.8	76.2	88.8
Other Provinces/Territories	5.3	63.8	79.6	89.9

Notes:

a. Inspired by the United Nations Human Development Index, Indigenous and Northern Affairs Canada constructs the Community Well-Being (CWB) index following each census (INAC 2017). Both indices measure development of political jurisdictions in terms of a weighted sum of selected variable outcomes. The CWB index consists of four equally weighted components and has a range of 0 – 100, as does each of the four components:

- Per capita income: This component transforms average per capita income, as measured by the census, into log form and expresses the result as a fraction of the upper bound of the log of C$40,000.
- Education level: Two thirds of this component is the fraction of the population, ages 20 and older, with at least high-school completion; the other third is the fraction of the population, ages 25 and older, with a university degree at the bachelor's level or higher.
- Housing quality: Two equally weighted elements, the fraction of the population living in a dwelling with fewer than one person per room, and the fraction of the housing not in need of major repair.
- Labour-force activity: Two equally weighted components, the fraction ages 20 to 65 "engaged in the labour market" at the time of the census whether employed or not, and the fraction ages 20 to 65 actually employed.

b. The statistics in columns 1 to 4 are the unweighted means of the relevant communities in each province or set of provinces.

c. The statistics in columns 5 to 8 are author's calculations from results of the National Household Survey conducted in 2011. Approximately half the Canadian population identifying as First Nations live on-reserve; half live in rural off-reserve and urban communities.

Sources: Author's calculations from INAC (2017), Canada (2013a, 2013b).

(Richards 2008,10). Which explains, in part, the intermediate position of Métis secondary completion rates between First Nations and non-indigenous populations (Richards 2014,5).

Obviously, the ability of families to support their childrens' education depends on parental education, family income and other measures of well-being. A useful proxy for these variables, available at the level of individual First Nations communities, is the Community Well-Being Index (CWB) prepared by Indigenous and Northern Affairs Canada (INAC 2017) following each census. Inspired by the United Nations Human Development Index, the CWB combines normalized sub-indices: an index of per capita income, of education levels, of housing quality, and of adult participation in the labour market. (For more information, see the note to Table A1.) Among First Nations communities, the lowest average provincial results on the CWB index are among First Nation communities in Manitoba and Saskatchewan (see Table A1, columns 1 – 4). For comparative purposes, INAC calculates CWB values for non-indigenous communities. The First Nations community sub-index values in Manitoba and Saskatchewan are at best two-thirds the CWB values for non-indigenous communities in the two provinces.

Finally, school quality matters. British Columbia is the province whose education ministry has innovated the most aggressively over the past quarter-century to improve Indigenous student outcomes in the provincial school system (Richards 2014). Almost certainly, these innovations explain, in part, the higher B.C. high-school completion rate among Indigenous students relative to other provinces.

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