Learning for the Future:
The performance of 15-Year-olds in Ireland on reading literacy, science and mathematics in PISA 2018

Executive Summary

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PISA 2018 national team

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Executive Summary

The Programme for International Student Assessment (PISA) is a project of the Organisation for Economic Cooperation and Development (OECD), of which Ireland is a member. PISA, which has taken place every three years since 2000, assesses the preparedness of 15-year-olds to meet the challenges they may encounter in their future lives, including education (OECD, 2019a). In 2018, over 600,000 15-year-olds in 79[1] countries/economies, including all 37 OECD countries, took part in PISA. In Ireland, 5,577 students in 157 schools took part. Reading literacy was the major assessment domain in 2018, with science and mathematics assessed as minor domains. In Ireland, PISA is implemented by the Educational Research Centre, on behalf of the Department of Education and Skills.

Throughout the Executive Summary, reference is made to targets in the *Action Plan for Education 2016-2019* (DES, 2016). The targets relate to student performance on PISA below Proficiency Level 2 (low-performing students) and at or above Proficiency Level 5 (high-performing students), to be achieved by 2025. As the Action Plan targets were set before the transition to computer-based assessment in PISA 2015, and significant revisions are made to the framework and test content for each domain every third cycle, consideration may need to be given to the relevance of those targets looking forward. It may also be prudent to consider the relative proximity of the performance of students in Ireland to each target, taking measurement error into account.

In the Executive Summary, and in the Main Report, comparisons are made using a selection of participating countries/regions based on their performance on reading literacy. Selected comparator countries are: Singapore, Estonia, Canada, Finland, Korea, Poland, Sweden, New Zealand, United Kingdom, United States, and Northern Ireland. The same set of countries comprises the comparison group for science and mathematics.

Tables on the performance of all participating countries/regions with valid data in reading literacy, science, and mathematics are provided in Appendix B.

Changes to PISA in 2018

PISA 2018 was the second full administration on a computer-based platform. Following on from the mode and design changes in 2015, several changes were incorporated into the design and administration of PISA in 2018, along with the revisions to the reading literacy framework.

The incorporation of a test of reading fluency into PISA 2018, where students were asked to mark as many sentences as possible as 'true' or 'false' within a specified period of time, was designed to provide a better measure of performance among students scoring at or below the lowest levels of proficiency. Adaptive testing was integrated in the assessment of reading literacy, providing increased accuracy of reporting scores at either end of the score distribution (below Level 1b and at Levels 4, 5 and 6). Machine-scoring of some open-ended responses was incorporated across the three domains, based on the scores awarded in the PISA 2015 Main Study and PISA 2018 Field Trial, resulting in increased efficiency and accuracy in the scoring phase of the study.

1 While 79 countries/regions participated in PISA 2018, reference is made to 78 countries/economies in reporting; full international comparability of results for Vietnam could not be assured at the time this report was published.

Implementation of PISA 2018 in Ireland

In Ireland, the PISA Main Study was carried out in March and April 2018. A representative sample of 157 schools in Ireland was selected to participate in PISA 2018, with all 157 schools participating, giving a school response rate of 100%. Within each school, up to 44 students aged 15 years (those born in 2002) were selected to participate, and were divided into two test sessions of up to 22 students. In total, 5,577 students participated in the assessment, yielding a weighted student response rate of 86.5%, with students spread over five year levels: First/Second Year (1.9%), Third Year (61.6%), Transition Year (27.9%) and Fifth Year (8.5%). Of participating students, 49.8% were female, and 50.2% were male (weighted percentages).

As was the case in PISA 2015, PISA 2018 was administered solely on laptops hired and transported to schools for the assessment by technical support persons, with Department of Education and Skills Inspectors acting as lead test administrators, alongside 24 support test administrators (mainly retired Inspectors and principals).

Students sat a 2-hour test session, followed by a 55-minute questionnaire session on the laptops. Parents of participating students were asked to complete a paper-based questionnaire, while school principals and teachers of Junior Cycle English were also invited to complete questionnaires on computer and on paper, respectively. The data collected during the Main Study were processed and scaled by the OECD's contractors, with the weights applied to students' responses based on the sampling process. Global competence was introduced as the innovative assessment domain in the 2018 cycle; however, Ireland and many other countries chose not to participate in the cognitive assessment component, though students in Ireland responded to questionnaire items on the same topic.

Overall performance on PISA 2018

Ireland's performance in reading literacy, science and mathematics was relatively stable between 2015 and 2018, with small but not statistically significant changes in each domain. On average across OECD countries between 2015 and 2018, mean scores on reading literacy and science dropped by small and non-significant amounts, while the mean score for mathematics increased non-significantly.

On reading literacy, students in Ireland are ranked 4th out of 36 OECD countries, and 3rd out of 27 EU countries. Student performance on PISA reading literacy in Ireland is characterised by an above-average percentage of high performers (12.1%), and a small and below-average percentage of low performers (11.8%); there are significantly fewer low performers and significantly more high performers in Ireland than on average across OECD countries. Comparing student performance in reading literacy in Ireland to 2009 (when reading was also the major assessment domain), Ireland's overall mean score was 22.4 points higher in 2018. However, comparisons between 2009 and 2018 should be made cautiously[2].

On science, students in Ireland ranked 17th among 37 OECD countries, and 11th out of 28 EU countries. Student performance on PISA science in Ireland is characterised by an average percentage of high performers (5.8%), and a

2 Issues with student engagement and the statistical model used to scale the PISA 2009 data, may have resulted in an underestimate of Ireland's reading literacy score (see Chapter 2, Section 2.2.1).

significantly lower percentage of low-performing students (17.0%) than on average across OECD countries. Coinciding with the introduction of computer-based testing in 2015, the overall trend in science performance in Ireland over the period 2012 to 2018 shows a significant decline (-25.9 points), but, as noted, the small drop (-6.5) between 2015 and 2018 is not statistically significant.

On mathematics, students in Ireland ranked 16th out of 37 OECD countries, and 11th out of 28 EU countries. Student performance on PISA mathematics in Ireland is characterised by a significantly lower percentage of high achievers (8.2%), and a significantly lower percentage of low-performing students (15.7%) compared with the corresponding OECD average percentages. The overall trend in mathematics performance between 2012 and 2018 is stable, with a non-significant change in mean score.

The relatively narrow range of achievement (low standard deviations around mean scores) in reading literacy, mathematics and science in Ireland compares favourably to the corresponding measure for OECD, EU, and selected comparator countries.

The gender gap in reading literacy in PISA 2018 in Ireland in favour of females (23.2 points) is statistically significant; however, it is among the lowest on average for OECD countries. For mathematics and science in Ireland, mean score differences between female and male students are not statistically significant. This differs from 2015 when male students performed significantly better than females in mathematics and science.

While the percentage of high achievers on reading literacy in Ireland is amongst the highest in the OECD, the percentages of students in Ireland performing at the highest levels in mathematics and science have receded in recent PISA cycles. A change in the proportion of high achievers in science between 2015 and 2018 is not significant. However, in mathematics there were significantly fewer high achievers in 2018 compared with 2012. Ireland has relatively lower proportions of high-performing students compared to countries with a similar mean score in mathematics and science.

Performance on reading literacy in PISA 2018

In preparation for the 2018 assessment, the PISA reading literacy framework underwent considerable revision, to better reflect how reading has evolved in recent years, mainly because of new technologies. As noted above, a new element, fluency, was added to the framework and to the assessment for 2018.

Ireland's mean score of 518.1 on the reading scale is significantly higher than the OECD average[3] of 487.1. Ireland ranked 4th out of 36 OECD countries (or between 1st and 5th if a 95% confidence interval is applied) and 8th out of all 77 participating countries/economies for whom valid data were available (between 5th and 9th if a 95% confidence interval is applied).

3 The OECD average for reading literacy in 2018 is based on 36 countries, while for mathematics and science, the average is based on 37 countries. Reporting on PISA 2018 reading literacy data for Spain is deferred until sub-optimal response patterns are investigated. For trend comparisons in reading literacy 2009-2018, the OECD average is based on 35 countries; trends for Austria were not reported in 2009.

The highest-performing countries/economies were B-S-J-Z[4] (China), Singapore and Macao (China). They significantly outperformed all other countries/economies, including Ireland. Six countries/regions (Hong Kong (China), Estonia, Canada, Finland, Korea, and Poland) had mean scores that did not differ significantly from Ireland's, while the remaining 67 countries/economies with valid data, including 30 OECD countries, had significantly lower scores. Among these were the selected comparator countries of the United Kingdom, the United States, New Zealand and Australia. Ireland's mean score is significantly higher than the EU average score of 481.7. Northern Ireland also had a mean score (500.7) that was significantly lower than Ireland's.

In Ireland, the standard deviation for reading literacy was 90.7, indicating a relatively narrow range of achievement. This compares favourably with the corresponding average standard deviations across OECD and EU countries (99.4 and 98.7 respectively). Among comparison countries, only Estonia (93.2) has a standard deviation as small as that of Ireland.

In Ireland, 11.8% of students performed at the lowest levels of proficiency on overall reading literacy (i.e., below Level 2), compared to 22.6% on average across OECD countries, indicating that there are relatively fewer students with very low achievement in reading literacy in Ireland. Ireland has the 2nd lowest percentage of low performers in reading literacy in the OECD, just behind Estonia (11.1%). This is also close to the target of 10% set out in the *Action Plan for Education 2016-2019*. Only one entity, B-S-J-Z (China), had a percentage of low performers in PISA 2018 below 10%.

Almost one in eight students in Ireland (12.1%) performed at the highest proficiency levels in reading (Levels 5-6 combined), and hence can be considered higher-achieving readers. On average across OECD countries, 8.7% perform at Levels 5-6, indicating that Ireland has more higher-achieving readers. Ireland has the 10th highest percentage of high performers across OECD countries, with Canada as the country with the highest proportion of high-achieving students at 15%. The percentage of students achieving at the highest levels in reading literacy in 2018 is within 1% of the target of 13% set out in the *Action Plan for Education 2016-2019*.

Student performance on reading literacy can be broken down into three superordinate cognitive subscales, Locating Information, Understanding, and Evaluating and Reflecting, and two source subscales, Single, and Multiple. Not unexpectedly, given Ireland's strong overall performance, students in Ireland performed well on all three reading process subscales. In Ireland, the mean score on Locating Information was 33.5 score points above the OECD average; it was 23.6 score points above the OECD average for Understanding; and it exceeded the OECD average by 30.0 points for Evaluating and Reflecting. Students in Ireland also scored significantly above the OECD average on both Single and Multiple text subscales, with a difference of 27.5 points for Single Texts and a difference of 26.5 points for Multiple Texts.

Female students in Ireland significantly outperformed male students on PISA 2018 overall reading. The difference, 23.2 score points in favour of females, was among the lowest across comparison countries, at a similar level to Singapore, the United States, Korea and the United Kingdom. On average across OECD countries, the gender difference in favour of female students was 29.7 points, while the average difference in favour of females across EU countries was 32.7 points. On the overall reading proficiency scale, 8.5% of females, and 15.1% of males performed below Level 2. Hence, there are more lower-achieving males than females in Ireland, a finding that also emerged on average across OECD countries where 27.7% of males, and 17.5% of females performed below Level 2. In Ireland, more females (13.8%) than males (10.3%) performed at Levels 5-6. The corresponding OECD average estimates were 10.4% and 7.1%% respectively.

4 B-S-J-Z (China) refers to the four PISA-participating provinces/municipalities of: Beijing, Shanghai, Jiangsu and Zhejiang.

In Ireland, the percentage of variation in reading attributed to differences between schools was 11.1%. This compared favourably with the OECD average of 29.0%. The estimate for Ireland also compares favourably with most countries in PISA 2018. The combination of relatively high average performance on reading, combined with relatively small differences between schools, is also found in Finland and Canada.

Trends in reading literacy performance

Ireland was amongst a group of countries that experienced a small and non-significant drop in reading performance since 2015 (-2.7 score points), but the decrease was lower than that experienced on average across OECD countries (-3.0 points).

Ireland's performance on reading literacy in 2009 was significantly lower than that of that achieved in previous cycles of PISA. Student performance in reading literacy in Ireland returned to the pre-2009 level in 2012, and has remained relatively stable in 2015 and 2018. Issues with the statistical model used to scale the PISA 2009 data and low engagement among students in Ireland may have resulted in an underestimate of Ireland's reading literacy score, meaning that comparisons between 2009 and 2018 should be made cautiously. These issues did not apply to PISA 2012 or 2015.

Female students in Ireland achieved a mean score in 2009 that was some 39.2 score points higher than male students. In 2015, the difference fell to 12.0 score points, before increasing to 23.2 points in 2018. On average across OECD countries, there was a gender gap of 39.3 score points in 2009 (based on 35 OECD countries[5]). This fell to 27.3 score points in 2015, before increasing slightly to 29.7 points in 2018.

In Ireland, 17.2% of students performed below Level 2 in 2009, and this dropped significantly to 11.8% in 2018. On average across OECD countries between 2009 and 2018, there was a significant increase in the percentage performing below Level 2, from 19.4% to 22.6%. There was a large and significant increase in the percentage of students in Ireland performing at or above Level 5 between 2009 and 2018 (+5.1%). On average across OECD countries, a significantly higher percentage of students also performed at Level 5 or above in 2018 (8.8%) compared with 2009 (7.3%).

In Ireland, fewer male students performed below Proficiency Level 2 in 2018 (15.1%) compared with 2009 (23.1%). The difference (-8.0 score points) is statistically significant. Fewer females in Ireland also performed below Level 2 in 2018 (8.5%) compared with 2009 (11.2%). On average across OECD countries, 25.7% of boys performed below Level 2 in 2009, while 27.7% did so in 2018. The difference, though small, is statistically significant.

In 2018, over twice as many male students in Ireland (10.3%) performed at or above Level 5, compared with 2009 (4.5%). The increase of 5.8% is statistically significant. There was also a statistically significant increase in the proportion of female students who performed at or above Level 5 in 2018 when compared to 2009 and 2015 (increases of 4.3% and 3.1% respectively). On average across OECD countries, 5.0% of boys performed at Levels 5-6 in 2009 and this increased significantly to 7.1% in 2018. In 2009, 9.7% of girls performed at Levels 5-6, and there was also a significant increase to 10.5% in 2018.

5 For trend comparisons in reading literacy 2009-2018, the OECD average is based on 35 countries; trends for Austria were not reported in 2009, while reporting reading literacy data for Spain is deferred for 2018.

Performance on science in PISA 2018

Science was a minor assessment domain in PISA 2018, having been the major domain in 2015, when a new framework and revised interactive items (for example, asking students to simulate experiments by choosing different values on two/three variables) were created to take advantage of computer-based assessment. With this transition from major to minor domain, the actual number of science items decreased, though the interactive science items comprised a greater proportion of the total item set in 2018.

The mean science score of students in Ireland on PISA 2018 was 496.1. This is significantly, if only slightly, above the OECD average of 488.7. Ireland ranked 17th among 37 OECD countries (or between 13th and 21st if a 95% confidence interval is applied), and 22nd among 78 participating countries/economies with valid data (or between 18th and 26th if a 95% confidence interval is applied).

Sixteen countries had significantly higher mean scores than Ireland, including the highest-scoring systems, B-S-J-Z China (590.5) and Singapore (550.9). Eleven countries had mean scores that were not significantly different from Ireland, while 50 countries/economies had significantly lower mean scores, including selected comparator countries Germany, the United States, Sweden, Belgium, France and Denmark. Ireland's mean score was significantly higher than the EU average score of 484.0. Northern Ireland had a mean science score (491.3) that was lower than but not significantly different from Ireland's.

Ireland's standard deviation in science, 88.3 score points, indicated of a narrower range of achievement, compared with the averages across OECD countries (93.5) and EU countries (93.8). Among comparison countries, only Estonia (87.8) had a standard deviation as low as Ireland's.

In Ireland, 17.0% of students performed below Proficiency Level 2. In general, there were fewer students below Level 2 in comparison countries with higher mean scores than Ireland's, such as Estonia (8.8%), Singapore (9.0%), Finland (12.9%), and Canada (13.4%). On average across OECD countries, 22.0% performed below Level 2, while in Northern Ireland almost 1 in 5 students (19.5%) did so. Ireland has the 8th lowest percentage of low performers among OECD countries; Estonia has the lowest percentage of students performing below Proficiency Level 2 (8.8%). The percentage of low performers in Ireland in 2018 is in excess of the target of 10% set out in the *Action Plan for Education 2016-2019*.

In Ireland, 5.8% of students performed at Proficiency Levels 5-6, which is on a par with the average across OECD countries (6.8%), even though Ireland's mean score is significantly higher than the OECD average. Among comparison countries, only Northern Ireland (5.4%) has (marginally) fewer students performing at Levels 5-6 than Ireland. Ireland is 21st among OECD countries for high performers in science; Japan is the country with the highest proportion of students considered as high-achieving at 13.1%. The percentage of students in Ireland achieving at the highest levels in science in 2018 is lower than the target of 13% set out in the *Action Plan for Education 2016-2019*.

Gender differences in science performance across countries tend to be small and non-significant. In Ireland, male students achieved a mean score of 495.4, while females achieved a mean score of 496.9. The difference, 1.5 score points in favour of females, is not statistically significant. On average across OECD countries, male students had a mean score of 487.5, while females had a mean score of 489.8. The difference in favour of females, 2.3 score points, is statistically significant.

In Ireland, more male students (18.1%) performed below Level 2, compared with females (16.0%), while on average across OECD countries, 23.2% of males and 20.8% of females performed below

Level 2. While the difference below Level 2 in Ireland is not significant, the OECD average difference is. More male students than female students in Ireland also achieved Levels 5-6 (6.8% and 4.9% respectively), though the difference is significant. On average across OECD countries, significantly more males (7.3%) than females (6.2%) achieved Levels 5-6.

Trends in science performance

Ireland's overall mean score on PISA science in 2018 (496.1) was some 6.5 score points lower than in 2015 (502.6), the last time science was the major domain of assessment. The change in performance is not statistically significant. Countries with negative changes in achievement that are statistically significant included Canada (-9.7 score points), Denmark (-9.3), Switzerland (-10.2), Japan (-9.3) and Finland (-8.8). In contrast, performance increased in Poland (+9.6) and Turkey (+42.8). On average across OECD countries, there was a small and non-significant decline in performance (-2.0 score points) between 2015 and 2018.

In PISA 2015 there was a significant difference of 10.5 score points in favour of male students in Ireland, whereas in 2018, there was a non-significant difference of 1.5 score points in favour of female students. Hence, while the mean score of males in Ireland dropped by 12.3 score points between 2015 and 2018, the mean score of females was almost the same in both years (497.2 and 496.9 respectively). On average across OECD countries, there was a statistically significant difference in favour of males in 2015 (3.4 score points) and a statistically significant difference (2.3 score points) in favour of females in 2018. On average across OECD countries, the mean score for males also dropped between 2015 and 2018 (from 492.3 to 487.5) while the mean scores of females were almost identical in both cycles (488.9 and 489.8 respectively).

Although the percentages of students in Ireland performing below Level 2 on the PISA science scale increased from 15.3% to 17.0% between 2015 and 2018, the change is not statistically significant. On average across OECD countries, the percentage of students performing below Level 2 remained almost the same, decreasing by 0.1% from 22.1% in 2015 to 22.0% in 2018. In Ireland, more males (18.1%) performed below Proficiency Level 2 in 2018, compared with 2015 (15.7%), though the difference is not statistically significant. More females also performed below Level 2 in 2018 (16.0%) compared with 2015 (14.9%), though again, the difference is not statistically significant. On average across OECD countries, more male students (23.2%) performed below Level 2 in 2018 compared with 2015 (22.6%), though the difference is not statistically significant. The corresponding estimates for females, 21.5% in 2015 and 20.8% in 2018, are significantly different.

There was a non-significant drop in the proportion of students in Ireland performing at Levels 5-6, from 7.1% in 2015 to 5.8% in 2018, while there was a small but significant decline, from 7.4% in 2015 to 6.8% in 2018, on average across OECD countries. In 2018, significantly fewer male students in Ireland (6.8%) performed at Levels 5-6, compared with 2015 (9.0%). Similar proportions of female students performed at or above Level 5 in both 2015 and 2018 (5.0% and 4.9% respectively). In 2018, on average across OECD countries, fewer male students performed at Levels 5-6 (7.3%) compared with 2015 (8.5%). The difference, 1.2%, is statistically significant. Similar percentages of females performed at Levels 5-6 in 2015 (6.3%) and 2018 (6.2%).

Performance on mathematics in PISA 2018

Mathematics was a minor assessment domain in PISA 2018. Unlike reading literacy and science, no items specifically designed for computer-based assessment were included, though this is due to

change in 2021, when PISA mathematics will be the major assessment domain. All PISA mathematics items administered in 2018 were drawn from the paper-based assessment in 2012.

The overall mean mathematics score of students in Ireland in 2018 was 499.6. This was significantly, if slightly, higher than OECD average score of 489.3. Ireland's mean score ranked 16th of 37 OECD countries (or between 12th and 21st, if a 95% confidence interval is applied), and 21st among all 78 participating countries with valid data (or between 17th and 26th if a 95% confidence interval is applied).

Sixteen countries had significantly higher mean scores than Ireland, including high-performing B-S-J-Z China (591.4 score points) and Singapore (569.0). Ireland's mean score does not differ significantly from ten countries/economies, including Sweden, the United Kingdom and Germany, while 51 countries performed significantly less well than Ireland. The mean score for Northern Ireland (492.0), although some 7.6 points lower than Ireland's score, is not significantly different.

Ireland's standard deviation for mathematics (77.8) is smaller the OECD average (90.6) and is among the smallest across all countries in PISA 2018. This indicates a narrower spread of mathematics achievement in Ireland than on average across OECD countries.

In Ireland, 15.7% of students performed below Level 2 on mathematics, indicating that they lacked the mathematical knowledge and skills required for future education and work. This was significantly below the OECD average of 24.0%. Just 7.1% of students in Singapore performed below Level 2. Hence, while Ireland had more lower-achieving students than countries with significantly higher average scores in mathematics, it had similar proportions to countries with mean scores that are not significantly different. Ireland has the 7th lowest percentage of low performers among OECD countries for mathematics. Estonia has the lowest percentage of students performing below Proficiency Level 2 in mathematics (10.2%) across the OECD. The percentage of low-performing students in mathematics in Ireland in 2018 is in excess of the target of 10% set out in the *Action Plan for Education 2016-2019*.

In Ireland, 8.2% of students performed at Levels 5-6 in PISA mathematics. This is significantly lower than the OECD average of 10.9%. A number of countries with overall mean scores not significantly different from Ireland's had proportionately more students at Levels 5-6, including Sweden (12.6%) and the UK (12.9%). In Northern Ireland, 8.3% of students performed at Levels 5-6. Ireland is 30th for the percentage of high-performers amongst OECD countries for mathematics. Across the OECD, Korea has the highest percentage of students performing at the highest levels in mathematics at 21.4%. The percentage of students in Ireland achieving at the highest levels in mathematics in 2018 is 2.7% lower than the target of the OECD average set out in the *Action Plan for Education 2016-2019*, which was 10.9% in 2018.

Gender differences in mathematics performance across countries tend to be small and non-significant. In Ireland, male students achieved a mean score of 502.6. Although higher than the mean score of females (496.7), the difference (5.9 score points) is not statistically significant. On average across OECD countries, the difference in favour of male students was marginally smaller than in Ireland (5.2 points), but reached statistical significance.

In Ireland, similar proportions of male and female students (15.7% in both cases) performed below Proficiency Level 2, while the corresponding OECD average percentages were higher, at 23.9% for males and 24.0% for females. Significantly more male students in Ireland (9.9%) compared with females (6.6%) performed at Levels 5-6, and the corresponding OECD averages, also significantly different from one another, were 12.3% and 9.5% respectively.

Trends in mathematics performance

In Ireland, overall mean scores in mathematics across cycles indicate quite a stable trend since 2012, with Ireland's 2018 mathematics mean score 4.1 points lower than in 2015, and 1.9 points lower than in 2012. Neither difference is statistically significant. The OECD average showed a small (-1.1 point) decline between 2012 and 2018, and an increase of 2.1 points between 2015 and 2018; neither difference is statistically significant.

There is a narrowing of the gender gap in mathematics performance in Ireland, with a non-significant difference in favour of males in 2018 (5.9 score points) compared with significant differences in favour of males in earlier cycles (15.3 score points in 2012, 16.1 in 2015). However, fluctuations in samples from cycle to cycle need to be taken into account in considering these changes.

The percentage of students in Ireland performing below Proficiency Level 2 increased slightly between 2015 and 2018 (from 15.0% to 15.7%), but was lower in both cycles than in 2012 (16.9%). The percentage of students achieving at or above Level 5 dropped significantly from 10.7% in 2012 to 8.2% in 2018. On average across OECD countries, similar percentages of students (24.4% in 2012, 24.6% in 2015, 24.0% in 2018) performed below Level 2. On average across OECD countries, the percentage performing at or above Level 5 dropped from 12.1% in 2012 to 10.3% in 2015, before increasing slightly to 10.9% in 2018. As in Ireland, the percentage of students performing at or above Level 5 on average across OECD countries was significantly lower in 2018 than in 2012.

Between 2012 and 2018 the percentage of males performing below Level 2 in Ireland increased marginally (+0.5%), while the percentage of females decreased (-3.0%); neither difference is statistically significant. On average across OECD countries, the percentage of males who performed below Level 2 increased non-significantly from 23.5% in 2012 to 23.9% in 2018, while the percentage of females performing below Level 2 decreased significantly, from 25.3% in 2012 to 24.0% in 2018.

The percentage of males in Ireland achieving at or above Level 5 dropped significantly between 2012 and 2018 (-2.8%), while the percentage of females performing at these levels dropped non-significantly (-2.0%). The proportions of students at or above Level 5 across OECD countries also fell significantly for both genders, with 14.0% of males scoring below Level 5 in 2012, and 12.3% doing so in 2018. Similarly, in 2012, 10.1% of females on average across OECD countries achieved at or above Level 5, compared with 9.5% of females in 2018.

Equity and socio-economic differences in PISA 2018 reading literacy

The total variation in reading performance accounted for by between-school differences was 11.1% in Ireland, compared to 29.0% on average across OECD countries. This indicates that the Irish education system is comparatively equitable across schools in relation to reading performance.

The correlation (relationship) between performance on PISA reading and the PISA index of Economic, Social and Cultural Status (ESCS) at the student level in Ireland is moderate (.33). Students in the highest ESCS quartile in Ireland achieved a significantly higher reading literacy scores (by 74.8 score points), compared with those in the lowest quartile. The corresponding difference was larger on average across OECD countries (88.8 score points), meaning that Ireland is relatively equitable on this measure.

Nonetheless, students in DEIS schools in Ireland had an average reading literacy score that is 51.2 points below that of students in non-DEIS schools, while a difference of 53.4 score points was

observed between fee-paying and non-fee paying schools in Ireland. An examination of mean scores in reading literacy by school sector and gender composition revealed significantly higher scores for students in girls' secondary and mixed secondary schools, compared to ETB vocational schools, with the difference between ETB vocational and boys' secondary and community/comprehensive schools non-significant.

Reading habits and strategies of students in PISA 2018

The percentage of students who never read for enjoyment increased from 33.4% in 2000, to 41.9% in 2009, to 47.7% in 2018. In 2018, students who did not read for enjoyment had a reading score that was lower, by 86.9 points, than the mean score of students who read for enjoyment for more than 1 hour per day. In 2018, significantly more males (56.1%) than females (39.4%) in Ireland reported that they did not read for enjoyment. Reading for enjoyment was significantly less frequent among students in DEIS schools (relative to students in non-DEIS schools) as well as among non-immigrant (native) students (relative to immigrant students).

A key development in the reading literacy framework for 2018 is the recognition of digital texts, which bring traditional texts and new forms of reading together. Students who read books more often in paper format, more often in digital format, and students who read books equally often in paper format and on digital devices had significantly higher mean scores on reading literacy (561.4, 511.3 and 541.8 respectively), than students who rarely or never read books (478.7).

In 2018, students in Ireland were slightly but significantly more likely to employ effective reading strategies for understanding and remembering (0.05) on an OECD-developed index, than on average across OECD countries (-0.01). Students in Ireland were also significantly more likely to employ effective summarising strategies than on average across OECD countries (0.10 and 0.00 respectively).

Students in Ireland achieved a mean score (0.21) on a composite index drawing on students' use of strategies to assess the credibility of sources in digital texts, which was significantly above the average across OECD countries (0.00). Students in the United Kingdom and Finland also scored relatively high on the index, while students in Korea scored below the OECD average. The performance of students in Ireland is positive given that they can expect to encounter large amounts of digital information of variable quality and credibility in the future.

Use of digital technologies by students in PISA 2018

In 2018, under half of participating students had taken a test on computer prior to PISA, which was up slightly from 2015 (46.5% in 2018 and 42.8% in 2015). Comparable data are not available for other countries.

For subject-related digital technology use in class, students in Ireland had a mean score (-0.37), which was significantly and substantially below the average across OECD countries (0.00). The corresponding figure for subject-related digital technology use outside of class for Ireland was -0.30, also significantly below the OECD average. This indicates an underuse of digital technology for school subjects by students in Ireland (inside and outside of class) compared to the corresponding averages across OECD countries.

Exploring how digital devices are used in classes, students in Ireland reported that across selected subjects (English[6], Science, and Mathematics), it was mainly the teacher who used digital devices in the classroom. The rate of use by teachers only in English class in Ireland (52.5% of students) was over twice that reported by students on average across OECD countries for classes in the test language (24.6%). On the other hand, use of digital devices by both teachers *and* students was higher on average across OECD countries (37.4%) than in Ireland (23.1%). In Ireland, teacher-only usage of digital devices was associated with higher performance in reading, mathematics and science among students, compared with student-only usage and teacher and student usage, perhaps reflecting uneven usage of digital technologies among students of different abilities in Ireland.

Principals' views on the capacity of their schools to enhance teaching and learning through digital technology are less favourable in Ireland than on average across the OECD. In particular, principals in Ireland highlighted access to technical support or assistance, the availability of effective professional resources for teachers to learn how to use digital technology, and the skill levels of teachers (and time for planning) as challenges to successful integration of digital technology in teaching and learning. This information from principals was collected in March and April 2018, and highlights the continued importance of the *Digital Strategy for Schools 2015-2020* (DES, 2015) and the roll-out of the *Digital Learning Framework* (DLF, DES, 2017), and indicates a need for ongoing for monitoring and enhancement of resources, supports and the provision of time for CPD and preparation for instruction. The final evaluation of the DLF (Cosgrove et al., 2018) identified a number of key challenges frequently highlighted by DLF leaders, teachers and the PDST advisors that are consistent with findings from PISA 2018.

Patterns of time spent using digital devices by students in Ireland indicate that moderate or lower levels of use are related to higher student performance on PISA reading literacy. For example, students who don't play computer games or play them for less than an hour a day achieved significantly higher scores on reading literacy than students with higher levels of usage; 539.5 and 535.0 score points respectively, compared to 517.3 for 1 to 3 hours of use, 498.6 for 3 to 5 hours of use, and 461.5 for more than 5 hours of use on a normal school day. Students who spent more than three hours watching TV (including online) had significantly lower reading performance that students who watched less television, or none at all. For interacting with friends on social media, students with moderate levels of activity (up to 3 hours of use) had significantly higher performance on reading, compared to no use or to the highest levels of social media activity.

Aspects of student well-being in PISA 2018

Worry about failing an exam or feeling nervous and stressed about exams is prevalent in Ireland, with 51.6% of students reporting that they often or always worry about what would happen if they fail an exam or test. Students in Ireland who reported that they often or always put themselves under pressure to do well on exams and tests scored significantly higher on reading literacy (531.0 and 548.5 respectively), compared with students who reported that they never put pressure on themselves to do well (494.0). Students who reported never feeling under pressure from their teachers to do well also scored significantly lower in reading literacy compared to students who reported sometimes feeling pressure (517.3), often feeling pressure (535.2) or always feeling pressure (530.1). Students who reported that they often or always felt physically unwell thinking about exams performed less

6 Some students sat the PISA assessment in Irish; students were asked to respond to questions about the test language, which was English for the majority of students.

well on average on reading literacy (498.9 and 509.1 respectively), compared to students who never feel physically sick thinking about exams (546.9). The different relationships between student performance on PISA and students' reports of exam stress, pressure and feeling physically unwell thinking about tests, highlight the complex inter-relationships between well-being, exam stress, and test performance. It may be the case that certain levels of exam stress or anxiety represent a 'healthy' desire to do well. However, the situation of students who report feeling physically unwell thinking about exams merits further analysis, not just in relation to their performance, but for their overall well-being.

Three-fifths (61.4%) of students in Ireland reported that they were satisfied with their lives, which is significantly lower than the overall average across OECD countries (66.9%). On average, significantly fewer female students in Ireland reported that they were satisfied with their life (55.5%) compared to male students (67.3%). Students in Ireland who reported that they were 'very satisfied' with their lives had a mean reading score of 505.2, which was significantly lower than the mean score of students who reported that they were not satisfied with life (522.8).

Almost half of students in Ireland (45.3%) reported feeling happy all of the time in normal circumstances, compared to 41.0% of students on average across OECD countries, while fewer students in Ireland felt cheerful, joyful or proud than students on average across OECD countries. Students in Ireland who are low Internet users were more likely to report positive feelings in general (e.g., happy or lively) and less likely to report negative feelings (e.g., sad or afraid) than heavy Internet users.

The findings related to aspects of student well-being in PISA 2018 are in line with recent research, including My World 2 (Dooley, et al., 2019). That study highlighted increased levels of depression and anxiety between two waves of the national study (2012 and 2019), that the top 3 stressors that adolescents endorsed were all school-related (school, exams and homework), and that male students were also more likely to be satisfied with life than their female peers. The findings underline the importance of underpinning and promoting the well-being of young people in Ireland that have been prioritised in recent years via inter-departmental policies and strategies, including *Better Outcomes, Brighter Futures: The National Policy Framework for Children and Young People, 2014-2020* (DCYA, 2014), Guidelines for Wellbeing in Junior Cycle (DES & NCCA, 2017), and the *Wellbeing Policy Statement and Framework for Practice* (DES, 2019).

The OECD published three volumes on the outcomes of PISA 2018 in December 2019, with further thematic reporting planned for 2020-2021. Further national-level analyses using data from PISA 2018 on key themes, such as digital technologies, student well-being and a more detailed look at student performance on PISA in DEIS schools, are also planned for 2020-2021.

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Appendix A: Membership of the PISA 2018 National Advisory Committee

In Ireland, PISA is administered on behalf of the Department of Education and Skills (DES) by the Educational Research Centre. The DES and the ERC are supported in their work by a National Advisory Committee. Members of the PISA 2018 National Advisory Committee are:

Orlaith O'Connor (Department of Education and Skills, Chair, from September 2019)

Suzanne Dillon (Department of Education and Skills, Chair, to August 2019)

Declan Cahalane (Department of Education and Skills, to April 2019)

Conor Galvin (University College Dublin)

Odilla Finlayson (Dublin City University)

Deirdre Henchy (State Examinations Commission, from April 2016)

Philip Matthews (Trinity College Dublin)

Brendan MacMahon (National University of Ireland Galway, from May 2016)

Kevin McClean (Department of Education and Skills, from April 2019)

Thomas McCloughlin (Dublin City University)

Hugh McManus (State Examinations Commission, to April 2016)

Frances Moss (Department of Education and Skills, from September 2019)

Brian Murphy (University College Cork)

Evelyn O'Connor (National Council for Curriculum and Assessment, from May 2016)

Liz O'Neill (Department of Education and Skills, to April 2016)

Maurice O'Reilly (Dublin City University)

Ruth Richards (Department of Education and Skills, to April 2019)

Barry Slattery (National Council for Curriculum and Assessment)

Peter Archer (ERC, PISA Governing Board representative, to September 2018)

Caroline McKeown (ERC, National Project Manager 2018, PISA Governing Board representative September 2018 – August 2019)

Gerry Shiel (ERC)

Sylvia Denner (ERC)

Sarah McAteer (ERC)

Lynsey O'Keeffe (ERC)

Rachel Perkins (ERC, PISA Governing Board representative, from September 2019)

Brenda Donohue (ERC, National Project Manager 2021).

Appendix B:
Tables of Country-level Performance in PISA 2018

Table B.1.
Tables of Country-level Performance in PISA 2018 Reading Literacy

Mean scores, standard deviations and standard errors for all participating countries/economies with valid data on the PISA 2018 reading literacy scale and positions relative to the OECD and Irish means, for all participating countries/economies

	Mean	SE	SD	SE	IRL		Mean	SE	SD	SE	IRL
B-S-J-Z (China)	555.2	(2.7)	87.2	(1.7)	▲	Greece	457.4	(3.6)	97.4	(1.6)	▼
Singapore	549.5	(1.6)	108.9	(1.0)	▲	Chile	452.3	(2.6)	92.0	(1.2)	▼
Macao (China)	525.1	(1.2)	92.1	(1.1)	▲	*Malta*	448.2	(1.7)	112.8	(1.2)	▼
Hong Kong (China)	524.3	(2.7)	99.5	(1.5)	O	*Serbia*	439.5	(3.3)	96.4	(1.4)	▼
Estonia	523.0	(1.8)	93.2	(1.2)	O	*United Arab Emirates*	431.8	(2.3)	113.3	(0.9)	▼
Canada	520.1	(1.8)	100.3	(0.8)	O	Romania	427.7	(5.1)	98.4	(2.2)	▼
Finland	520.1	(2.3)	99.6	(1.3)	O	*Uruguay*	427.1	(2.8)	95.9	(1.6)	▼
Ireland	**518.1**	**(2.2)**	**90.7**	**(1.0)**		*Costa Rica*	426.5	(3.4)	81.3	(1.7)	▼
Korea	514.1	(2.9)	102.0	(1.7)	O	*Cyprus*	424.4	(1.4)	98.0	(0.9)	▼
Poland	511.9	(2.7)	97.3	(1.4)	O	*Moldova*	424.0	(2.4)	93.3	(1.6)	▼
Sweden	505.8	(3.0)	107.5	(1.5)	▼	*Montenegro*	421.1	(1.1)	86.0	(0.8)	▼
New Zealand	505.7	(2.0)	106.3	(1.3)	▼	Mexico	420.5	(2.7)	83.5	(1.6)	▼
United States	505.4	(3.6)	107.9	(1.6)	▼	Bulgaria	419.8	(3.9)	101.4	(1.8)	▼
United Kingdom	503.9	(2.6)	100.2	(1.3)	▼	*Jordan*	419.1	(2.9)	87.3	(1.7)	▼
Japan	503.9	(2.7)	97.1	(1.7)	▼	*Malaysia*	415.0	(2.9)	84.8	(1.6)	▼
Australia	502.6	(1.6)	108.7	(0.9)	▼	Brazil	412.9	(2.1)	99.6	(1.3)	▼
Chinese Taipei	502.6	(2.8)	101.7	(1.5)	▼	Columbia	412.3	(3.3)	88.7	(1.5)	▼
Denmark	501.1	(1.8)	92.1	(1.2)	▼	*Brunei Darussalam*	408.1	(0.9)	97.4	(0.8)	▼
Norway	499.5	(2.2)	105.7	(1.3)	▼	*Qatar*	407.1	(0.8)	109.6	(0.6)	▼
Germany	498.3	(3.0)	105.7	(1.5)	▼	*Albania*	405.4	(1.9)	80.3	(1.2)	▼
Slovenia	495.3	(1.2)	93.6	(1.2)	▼	*Bosnia and Herzegovina*	403.0	(2.9)	79.3	(1.2)	▼
Belgium	492.9	(2.3)	102.6	(1.3)	▼	*Argentina*	401.5	(3.0)	97.8	(1.5)	▼
France	492.6	(2.3)	101.2	(1.5)	▼	*Peru*	400.5	(3.0)	91.8	(1.5)	▼
Portugal	491.8	(2.4)	96.1	(1.2)	▼	*Saudi Arabia*	399.2	(3.0)	84.4	(1.6)	▼
Czech Republic	490.2	(2.5)	97.3	(1.6)	▼	*Thailand*	392.9	(3.2)	78.9	(1.6)	▼
Netherlands	484.8	(2.7)	104.8	(1.7)	▼	*Republic of North Macedonia*	392.7	(1.1)	94.3	(1.0)	▼
Austria	484.4	(2.7)	99.4	(1.2)	▼	*Baku (Azerbaijan)*	389.4	(2.5)	74.1	(1.7)	▼
Switzerland	483.9	(3.1)	102.7	(1.5)	▼	*Kazakhstan*	386.9	(1.5)	77.3	(1.2)	▼
Croatia	479.0	(2.7)	89.2	(1.7)	▼	*Georgia*	379.8	(2.2)	84.3	(1.2)	▼
Latvia	478.7	(1.6)	90.0	(1.1)	▼	*Panama*	377.0	(3.0)	87.8	(1.9)	▼
Russian Federation	478.5	(3.1)	92.9	(1.8)	▼	*Indonesia*	371.0	(2.6)	75.1	(1.7)	▼
Italy	476.3	(2.4)	96.9	(1.7)	▼	*Morocco*	359.4	(3.1)	74.6	(1.1)	▼
Hungary	476.0	(2.3)	97.6	(1.3)	▼	*Lebanon*	353.4	(4.3)	113.3	(1.6)	▼
Lithuania	475.9	(1.5)	94.3	(1.0)	▼	*Kosovo*	353.1	(1.1)	68.3	(0.7)	▼
Iceland	474.0	(1.7)	104.7	(1.3)	▼	*Dominican Republic*	341.6	(2.9)	81.8	(1.8)	▼
Belarus	473.8	(2.4)	89.4	(1.3)	▼	*Philippines*	339.7	(3.3)	79.9	(2.3)	▼
Israel	470.4	(3.7)	124.5	(1.9)	▼						
Luxembourg	470.0	(1.1)	108.4	(1.0)	▼						
Ukraine	466.0	(3.5)	93.3	(1.7)	▼						
Turkey	465.6	(2.2)	87.7	(1.6)	▼	OECD AVG-R	487.1	(0.4)	99.4	(0.2)	▼
Slovak Republic	458.0	(2.2)	100.3	(1.4)	▼	EU Average	481.7	(0.5)	98.7	(0.3)	▼

	Significantly above OECD average
	At OECD average
	Significantly below OECD average

▲	Significantly higher than Ireland
O	Not significantly different from Ireland
▼	Significantly lower than Ireland

OECD countries are in regular font, partner countries/economies are in italics.
OECD AVG-R is used for Reading data: arithmetic mean for 36 of 37 OECD countries (excluding Spain).
Reporting on reading literacy data for Spain is deferred until sub-optimal response patterns are investigated.
Data for Vietnam are excluded they have not been fully validated for international comparability.

Table B.2.
Tables of Country-level Performance in PISA 2018 Science

Mean scores, standard deviations and standard errors for all participating countries/economies with valid data on the PISA 2018 science scale and positions relative to the OECD and Irish means, for all participating countries/economies

	Mean	SE	SD	SE	IRL		Mean	SE	SD	SE	IRL
BSJZ China	590.5	(2.7)	83.2	(1.7)	▲	Slovak Rep.	464.0	(2.3)	95.8	(1.5)	▼
Singapore	550.9	(1.5)	97.5	(1.0)	▲	Israel	462.2	(3.6)	110.8	(1.9)	▼
Macao China	543.6	(1.5)	83.0	(1.0)	▲	*Malta*	456.6	(1.9)	106.9	(1.2)	▼
Estonia	530.1	(1.9)	87.8	(1.2)	▲	Greece	451.6	(3.1)	85.9	(1.6)	▼
Japan	529.1	(2.6)	92.1	(1.6)	▲	Chile	443.6	(2.4)	83.5	(1.4)	▼
Finland	521.9	(2.5)	96.4	(1.3)	▲	*Serbia*	439.9	(3.0)	91.6	(1.3)	▼
Korea	519.0	(2.8)	97.9	(1.7)	▲	*Cyprus*	439.0	(1.4)	93.0	(1.1)	▼
Canada	518.0	(2.2)	95.7	(1.0)	▲	*Malaysia*	437.6	(2.7)	76.8	(1.5)	▼
HK China	516.7	(2.5)	86.2	(1.2)	▲	*United Arab Emirates*	433.6	(2.0)	103.2	(0.8)	▼
Chinese Taipei	515.7	(2.9)	99.3	(1.5)	▲	*Brunei Darussalam*	431.0	(1.2)	95.9	(1.1)	▼
Poland	511.0	(2.6)	91.5	(1.4)	▲	*Jordan*	429.3	(2.9)	88.2	(1.5)	▼
New Zealand	508.5	(2.1)	102.3	(1.4)	▲	*Moldova*	428.5	(2.3)	89.0	(1.4)	▼
Slovenia	507.0	(1.3)	88.1	(1.1)	▲	*Thailand*	425.8	(3.2)	81.8	(1.6)	▼
United Kingdom	504.7	(2.6)	99.0	(1.4)	▲	*Uruguay*	425.8	(2.5)	86.5	(1.4)	▼
Netherlands	503.4	(2.8)	104.4	(1.9)	▲	*Romania*	425.8	(4.6)	90.1	(1.8)	▼
Germany	503.0	(2.9)	102.9	(1.6)	O	*Bulgaria*	424.1	(3.6)	94.6	(2.0)	▼
Australia	503.0	(1.8)	100.7	(1.1)	▲	Mexico	419.2	(2.6)	74.4	(1.6)	▼
United States	502.4	(3.3)	99.1	(1.6)	O	*Qatar*	419.1	(0.9)	103.0	(0.9)	▼
Sweden	499.4	(3.1)	98.0	(1.5)	O	*Albania*	416.7	(2.0)	74.1	(1.1)	▼
Belgium	498.8	(2.2)	98.8	(1.3)	O	*Costa Rica*	415.6	(3.3)	73.3	(1.9)	▼
Czech Rep.	496.8	(2.5)	94.5	(1.6)	O	*Montenegro*	415.2	(1.3)	81.4	(1.0)	▼
Ireland	**496.1**	**(2.2)**	**88.3**	**(1.2)**		Colombia	413.3	(3.1)	82.0	(1.4)	▼
Switzerland	495.3	(3.0)	96.8	(1.4)	O	*Rep. of North Macedonia*	413.0	(1.4)	91.8	(1.2)	▼
France	493.0	(2.2)	96.0	(1.4)	O	*Peru*	404.2	(2.7)	80.1	(1.5)	▼
Denmark	492.6	(1.9)	91.5	(1.3)	O	*Argentina*	404.1	(2.9)	89.6	(1.6)	▼
Portugal	491.7	(2.8)	92.0	(1.3)	O	*Brazil*	403.6	(2.1)	90.3	(1.5)	▼
Norway	490.4	(2.3)	98.4	(1.2)	O	*Bosnia and Herzegovina*	398.5	(2.7)	76.6	1.3)	▼
Austria	489.8	(2.8)	95.6	(1.2)	O	*Baku (Azerbaijan)*	397.6	(2.4)	73.7	(1.6)	▼
Latvia	487.3	(1.8)	84.3	(1.2)	▼	*Kazakhstan*	397.1	(1.7)	75.7	(1.4)	▼
Spain	483.3	(1.6)	89.5	(0.8)	▼	*Indonesia*	396.1	(2.4)	69.3	(1.7)	▼
Lithuania	482.1	(1.6)	90.3	(1.0)	▼	*Saudi Arabia*	386.2	(2.8)	78.7	(1.4)	▼
Hungary	480.9	(2.3)	93.9	(1.4)	▼	*Lebanon*	383.7	(3.5)	95.4	(1.6)	▼
Russian Fed.	477.7	(2.9)	83.9	(1.7)	▼	*Georgia*	382.7	(2.3)	80.9	(1.3)	▼
Luxembourg	476.8	(1.2)	98.5	(1.2)	▼	*Morocco*	376.6	(3.0)	66.9	(1.2)	▼
Iceland	475.0	(1.8)	91.1	(1.0)	▼	*Kosovo*	364.9	(1.2)	64.7	(0.8)	▼
Croatia	472.4	(2.8)	89.9	(1.6)	▼	*Panama*	364.6	(2.9)	85.4	(1.9)	▼
Belarus	471.3	(2.4)	85.0	(1.3)	▼	*Philippines*	356.9	(3.2)	75.2	(2.3)	▼
Ukraine	469.0	(3.3)	91.4	(1.8)	▼	*Dominican Rep.*	335.6	(2.5)	70.6	(1.6)	▼
Turkey	468.3	(2.0)	83.5	(1.6)	▼	OECD Average	488.7	(0.4)	93.5	(0.2)	▼
Italy	468.0	(2.4)	90.1	(1.7)	▼	EU Average	484.0	(0.5)	93.8	(0.3)	▼

	Significantly above OECD average
	At OECD average
	Significantly below OECD average

▲	Significantly higher than Ireland
O	Not significantly different from Ireland
▼	Significantly lower than Ireland

Table B.3.
Tables of Country-level Performance in PISA 2018 Mathematics

Mean scores, standard deviations and standard errors for all participating countries/economies with valid data on the PISA 2018 mathematics scale and positions relative to the OECD and Irish means, for all participating countries/economies

	Mean	SE	SD	SE	IRL		Mean	SE	SD	SE	IRL
BSJZ China	591.4	(2.5)	80.3	(1.8)	▲	Israel	463.0	(3.5)	108.5	(1.9)	▼
Singapore	569.0	(1.6)	94.0	(1.2)	▲	Turkey	453.5	(2.3)	88.2	(1.8)	▼
Macao China	557.7	(1.5)	80.7	(1.5)	▲	*Ukraine*	453.1	(3.6)	94.0	(1.9)	▼
HK China	551.2	(3.0)	93.9	(1.9)	▲	Greece	451.4	(3.1)	89.2	(1.8)	▼
Chinese Taipei	531.1	(2.9)	99.7	(1.7)	▲	*Cyprus*	450.7	(1.4)	94.7	(1.1)	▼
Japan	527.0	(2.5)	86.5	(1.6)	▲	*Serbia*	448.3	(3.2)	96.7	(1.7)	▼
Korea	525.9	(3.1)	100.4	(2.0)	▲	*Malaysia*	440.2	(2.9)	83.1	(1.7)	▼
Estonia	523.4	(1.7)	81.6	(1.1)	▲	*Albania*	437.2	(2.4)	83.1	(1.3)	▼
Netherlands	519.2	(2.6)	93.3	(1.8)	▲	*Bulgaria*	436.0	(3.8)	97.4	(2.1)	▼
Poland	515.6	(2.6)	90.1	(1.7)	▲	*United Arab Emirates*	434.9	(2.1)	105.7	(1.2)	▼
Switzerland	515.3	(2.9)	94.3	(1.4)	▲	*Brunei Darussalam*	430.1	(1.2)	91.4	(1.0)	▼
Canada	512.0	(2.4)	92.3	(1.1)	▲	*Romania*	429.9	(4.9)	94.0	(2.1)	▼
Denmark	509.4	(1.7)	82.4	(1.0)	▲	*Montenegro*	429.6	(1.2)	83.3	(1.0)	▼
Slovenia	508.9	(1.4)	89.0	(1.4)	▲	*Kazakhstan*	423.1	(1.9)	87.0	(1.1)	▼
Belgium	508.1	(2.3)	95.4	(1.7)	▲	*Moldova*	420.6	(2.4)	94.4	(1.7)	▼
Finland	507.3	(2.0)	82.4	(1.2)	▲	*Baku (Azerbaijan)*	419.6	(2.8)	89.3	(1.7)	▼
Sweden	502.4	(2.7)	90.7	(1.4)	O	*Thailand*	418.6	(3.4)	87.8	(1.8)	▼
United Kingdom	501.8	(2.6)	93.0	(1.4)	O	*Uruguay*	417.7	(2.6)	85.3	(1.7)	▼
Norway	501.0	(2.2)	90.5	(1.3)	O	Chile	417.4	(2.4)	84.6	(1.4)	▼
Germany	500.0	(2.6)	95.4	(1.5)	O	*Qatar*	414.2	(1.2)	98.1	(0.9)	▼
Ireland	**499.6**	**(2.2)**	**77.8**	**(1.0)**		Mexico	408.8	(2.5)	77.6	(1.6)	▼
Czech Rep.	499.5	(2.5)	93.2	(1.7)	O	*Bosnia and Herzegovina*	406.4	(3.1)	82.0	(1.3)	▼
Austria	498.9	(3.0)	93.5	(1.5)	O	*Costa Rica*	402.3	(3.3)	74.7	(2.0)	▼
Latvia	496.1	(2.0)	80.3	(1.1)	O	*Peru*	399.8	(2.6)	84.4	(1.5)	▼
France	495.4	(2.3)	92.6	(1.5)	O	*Jordan*	399.8	(3.3)	85.2	(1.7)	▼
Iceland	495.2	(2.0)	90.2	(1.2)	O	*Georgia*	397.6	(2.6)	88.5	(1.6)	▼
New Zealand	494.5	(1.7)	93.2	(1.1)	O	*Rep. of North Macedonia*	394.4	(1.6)	93.5	(1.2)	▼
Portugal	492.5	(2.7)	96.4	(1.3)	▼	*Lebanon*	393.5	(4.0)	105.6	(1.6)	▼
Australia	491.4	(1.9)	92.2	(1.2)	▼	Colombia	390.9	(3.0)	81.2	(2.0)	▼
Russian Fed.	487.8	(3.0)	86.0	(1.9)	▼	*Brazil*	383.6	(2.0)	87.5	(1.6)	▼
Italy	486.6	(2.8)	93.8	(1.8)	▼	*Argentina*	379.5	(2.8)	84.0	(1.7)	▼
Slovak Rep.	486.2	(2.6)	99.6	(1.7)	▼	*Indonesia*	378.7	(3.1)	79.3	(2.2)	▼
Luxembourg	483.4	(1.1)	98.3	(1.3)	▼	*Saudi Arabia*	373.2	(3.0)	78.7	(1.6)	▼
Spain	481.4	(1.5)	88.4	(1.0)	▼	*Morocco*	367.7	(3.3)	76.1	(1.5)	▼
Lithuania	481.2	(2.0)	91.4	(1.1)	▼	*Kosovo*	365.9	(1.5)	77.2	(1.3)	▼
Hungary	481.1	(2.3)	91.1	(1.6)	▼	*Panama*	352.8	(2.7)	77.5	(2.1)	▼
United States	478.2	(3.2)	92.1	(1.5)	▼	*Philippines*	352.6	(3.5)	78.5	(2.0)	▼
Belarus	471.9	(2.7)	93.0	(1.4)	▼	*Dominican Rep.*	325.1	(2.6)	71.5	(2.0)	▼
Malta	471.7	(1.9)	101.9	(1.4)	▼	OECD Average	489.3	(0.4)	90.6	(0.2)	
Croatia	464.2	(2.5)	86.5	(1.7)	▼	EU Average	488.6	(0.5)	91.2	(0.3)	

	Significantly above OECD average
	At OECD average
	Significantly below OECD average

▲	Significantly higher than Ireland
O	Not significantly different from Ireland
▼	Significantly lower than Ireland

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