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# GENDER EQUALITY IN EDUCATION: LOOKING BEYOND PARITY

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# WHAT CAN WE LEARN ABOUT THE GENDER GAP FROM PISA

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## INTRODUCTION

Despite sustained progress, gender equality remains an unattained goal. On average across OECD countries, girls now attain higher grades and have better progression rates than boys in primary and secondary education, and they tend to outnumber boys among new college graduates in most industrialised countries (EAG, 2010). However, women typically earn less than men and are more likely to work irregular hours, hold part-time jobs and have more fragmented careers. These differences are less striking in some countries, notably those where public policies have created favourable conditions for women to fully participate in the economy and society at large.[i] However, full equality remains elusive (OECD, 2004; OECD 2011). Gender equality is not only a moral imperative, it also makes economic sense: gender equality in the labour market is correlated with economic growth and development.[ii] Greater economic opportunities for women can lead to stronger, more inclusive and sustainable growth by raising the overall quality of human capital and level of productivity. Higher rates of formal participation in the labour market among women can also help countries tackle the twin problems of low fertility and population ageing (OECD, 2007).

In this paper we examine gender differences in reading, science and mathematics performance as boys and girls approach the end of compulsory schooling in a wide range of countries as well as gender differences in career expectations, attitudes and motivation. We use data from the 2000, 2003, 2006 and 2009 Programme for International Student Assessment (PISA), the most comprehensive study on student achievement at age 15 in reading, science and mathematics. PISA offers a unique opportunity to explore not only gender differences in achievement but also gender differences in career expectations and the attitudes and motivation of boys and girls. These are all factors which may lead to gender differences in outcomes while still at school, in the labour market and in overall levels of well-being.

The Programme for International Student Assessment (PISA) is one of the most rigorous and comprehensive international studies assessing students' competencies in science, mathematics and reading. PISA measures to what extent students have acquired the knowledge and skills necessary for full participation in today's knowledge-based society. The programme also explores why students perform differently in different contexts by collecting a wealth of data on individual student characteristics, students' family backgrounds and the characteristics of schools and education systems. PISA also identifies which countries are successful in achieving both strong student performance and an equitable distribution of learning opportunities and, in so doing, signal sound educational policies and practices.

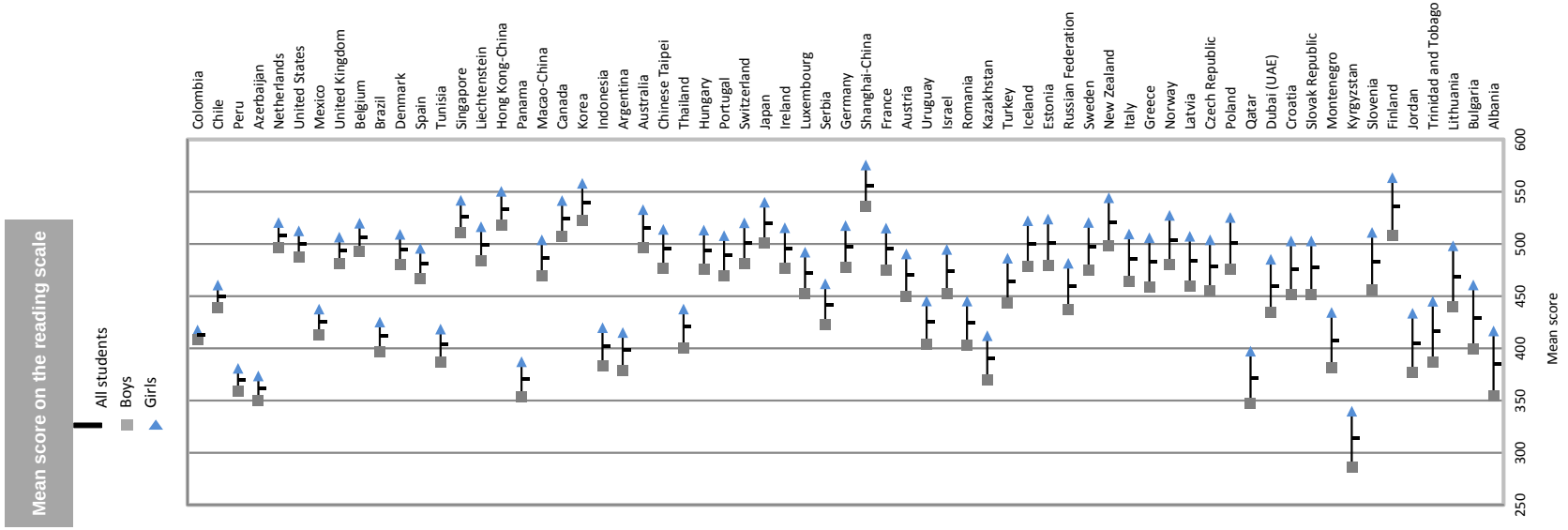
PISA assesses the performance of 15-year-old students in reading, mathematics and science. Since these students are nearing the end of their compulsory education in most countries, PISA offers an invaluable opportunity to map the skills and competencies of young people as they enter the job market for the first time. The first PISA survey was conducted in 2000 in 32 countries, and focused on reading. The second survey, in 2003, was carried out in 41 countries and focused on mathematics. In 2006, PISA assessed more than 400,000 students in 30 OECD countries and 27 partner countries and economies and focused on science. In 2009, PISA assessed over 450,000

students in 34 OECD countries and 31 partner countries and economies and focused again on reading. Each assessment covers the other two subjects, albeit as minor subjects.

## SECTION I GENDER DIFFERENCES IN READING, MATH AND SCIENCE PERFORMANCE

Concern about gender differences in education in much of the twentieth century focused on the disadvantage and underachievement of girls. More recently, however, the underachievement of boys in reading has become the focus of policy attention. In the PISA 2009 reading assessment, girls outperform boys in every participating country by an average, across OECD countries, of 39 PISA score points: over half a proficiency level and roughly the equivalent of an average school year's progress. Figure 1 shows gender differences in reading performance for each country that took part in the PISA 2009 assessment.

**Figure 1 Gender differences in reading performance**



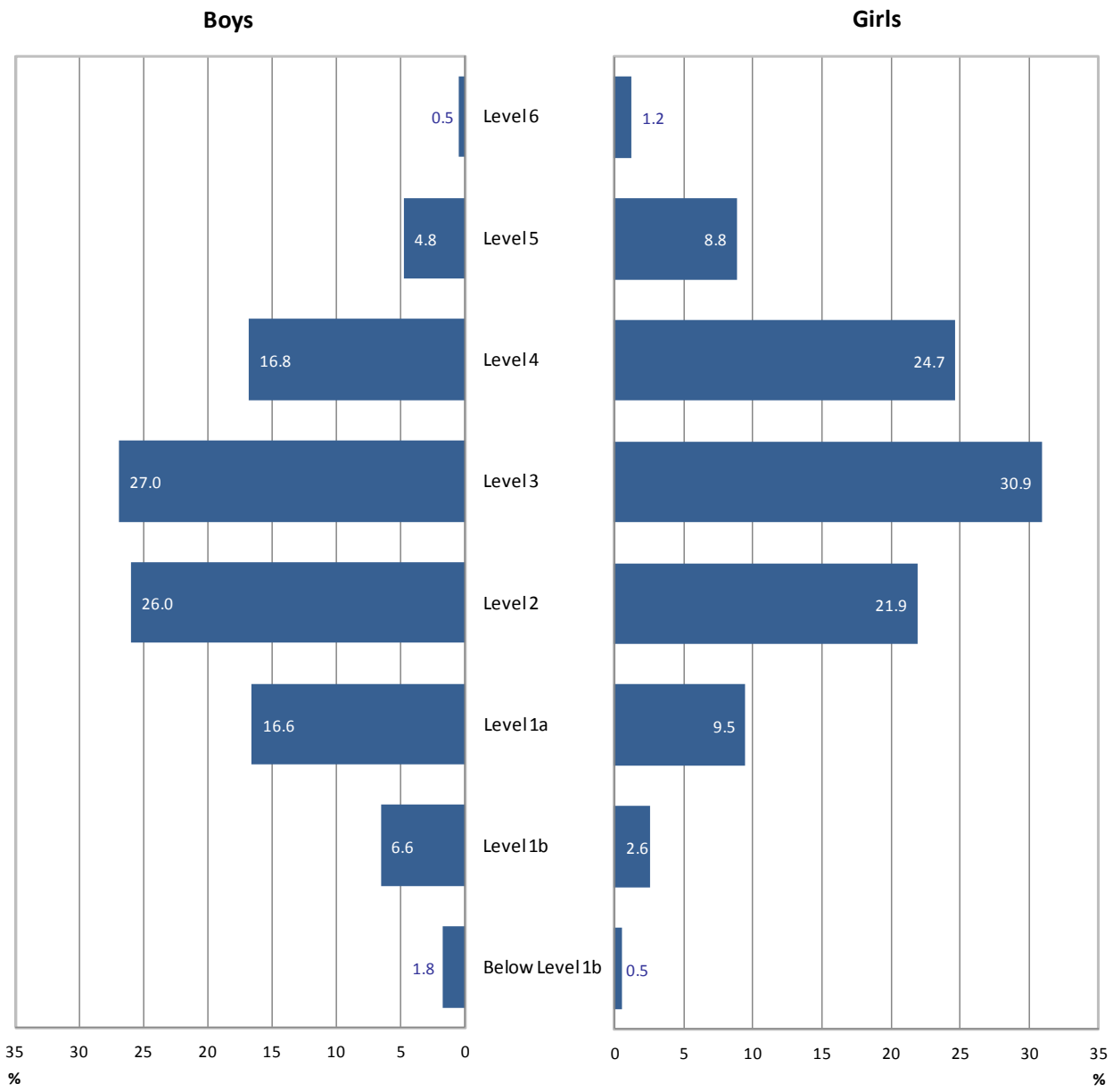

Note: All gender differences are significant (see Annex A3 to OECD PISA 2009 Volume I).
Countries are ranked in ascending order of the gender score point difference (girls - boys).
Source: OECD PISA 2009 database, Table I.2.3.

While girls outperform boys in reading in every participating country, the gap is much wider in some countries than in others. These differences closely relate to gender differences in student attitudes and behaviours. With the exception of Denmark, the Northern European countries have above-average gender gaps; the most pronounced of these is in Finland, where the score difference is, at 55 points, the greatest of all OECD countries. The gender differences in East Asian countries and economies tend to cluster just below the average, with Korea, Hong Kong-China, Macao-China and Chinese Taipei all showing gaps between 33 and 37 points. However, the highest performing among these countries and economies, Shanghai-China, also has a slightly wider gender gap of 40 points.

In each of the country groups described above, the country with the highest or second highest mean overall is also the country with the widest gender gap. In other words, in these countries, girls are disproportionately contributing to the country's high reading proficiency. Strategies to improve boys' reading proficiency would have an accentuated effect on overall achievement. Yet there is no obvious pattern regarding gender performance among groups of countries with lower performance overall. For example, among the group of Latin American countries, both the highest performing overall (Chile) and the lowest performing (Peru) have the same, relatively small, gender gap (22 points). One of the middle-ranking countries within this group, Colombia, has by far the smallest gender gap of any country, with a difference of only nine score points between the means for girls and boys.

How significant are the gender differences in terms of the average level of proficiency that boys and girls achieve? One way to think of this is to consider where most boys and girls fall in terms of proficiency levels. The most common highest proficiency level for both boys and girls is Level 3, but whereas almost as many boys are at Level 2 as Level 3, for girls, Level 4 is the second most common level attained. Another way to compare performance around the middle of the reading scale is by noting that half of boys (51%) but only a third of girls (34%) fail to reach Level 3, which is associated with being able to perform the kinds of tasks that are commonly demanded of young and older adults in their everyday lives. This represents a major difference in the capabilities of boys and girls at age 15.

**Figure 2 How proficient are girls and boys in reading?**



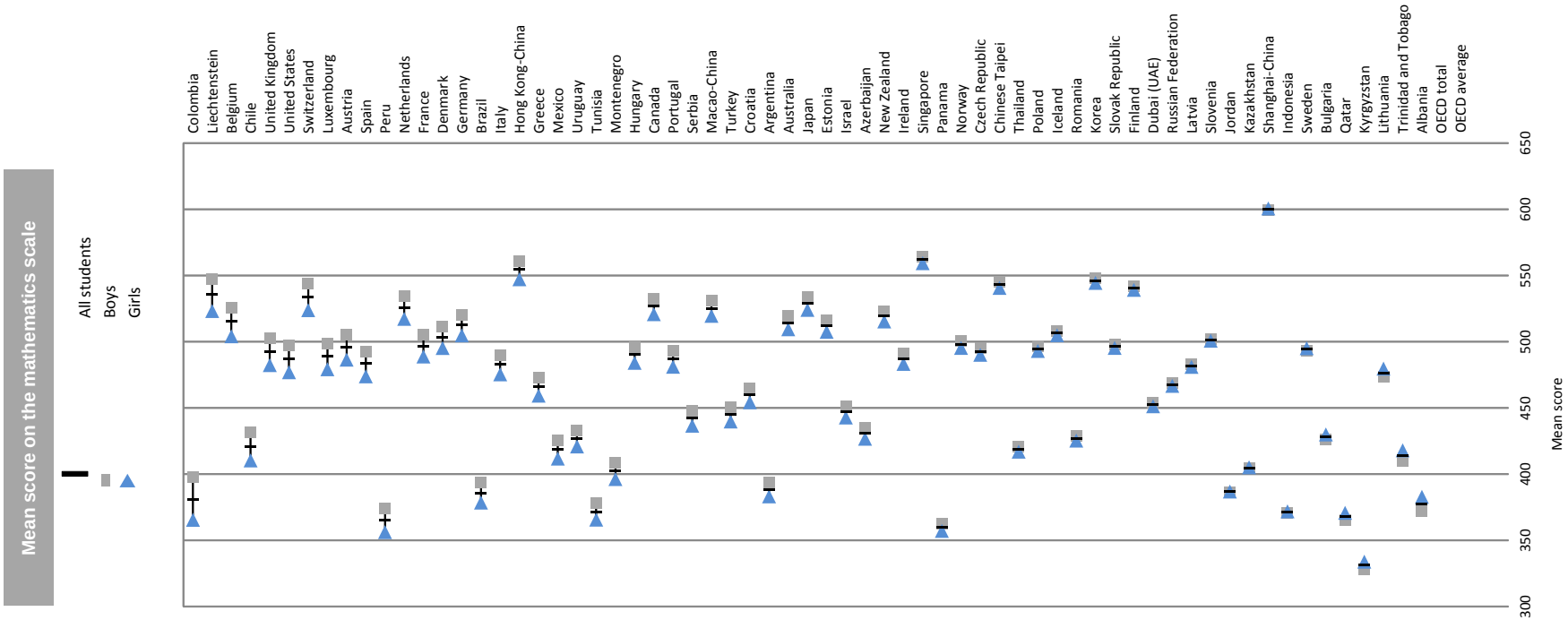

Source: OECD PISA 2009 database, Table I.2.2.

Gender differences are also important when comparing the number of students with particularly low levels of reading proficiency. Eighteen countries had more than 50% of 15-year-old boys performing below Level 2 on the reading scale, but only five countries showed the same proportion of girls at that level. Across OECD countries, only about half as many girls as boys perform below Level 2, but the ratio varies according to overall country performance. In countries with generally low levels of performance in reading, the proportions of girls and boys performing below Level 2 tend to be similar. For example, there are at least four-fifths of the number of girls as boys performing below Level 2 in Colombia, Kyrgyzstan, Azerbaijan, Peru and Panama, all of which have

low mean reading scores overall. In these countries'efforts to develop reading proficiency, boys and girls need to receive equal attention. In contrast, the two countries with the widest gender gap at low levels of performance are two of the highest performing countries overall. In Finland and Shanghai-China, the number of girls performing below Level 2 is only one-quarter that of the number of boys.

In terms of mathematics performance, out of 65 participating countries in PISA 2009, 35 indicated that boys perform at higher levels, while only in 5 countries did girls outperform boys. For the countries where boys perform better on the mathematics scale, gender differences vary widely. However, on average these tend to be much smaller than corresponding gender differences observed on the reading scale. The largest gender differences are observed in Belgium, Chile, the United Kingdom and the United States, with an advantage of 20 score point or more for boys and a difference of 32 and 24 score points, respectively, in the partner countries and economies of Colombia, Liechtenstein. Japan, New Zealand, Ireland, Norway, the Czech Republic, Poland, Iceland, Korea, the Slovak Republic, Finland, Slovenia and Sweden. In addition the partner countries and economies of Panama, Chinese Taipei, Thailand, Romania, Dubai (UAE), the Russian Federation, Latvia, Jordan, Kazakhstan, Shanghai-China, Indonesia and Bulgaria do not show measurable differences between the scores for boys and girls. In the partner countries and economies of Qatar, Kyrgyzstan, Lithuania, Trinidad and Tobago and Albania, girls outperformed boys in mathematics by between five and 11 score points.

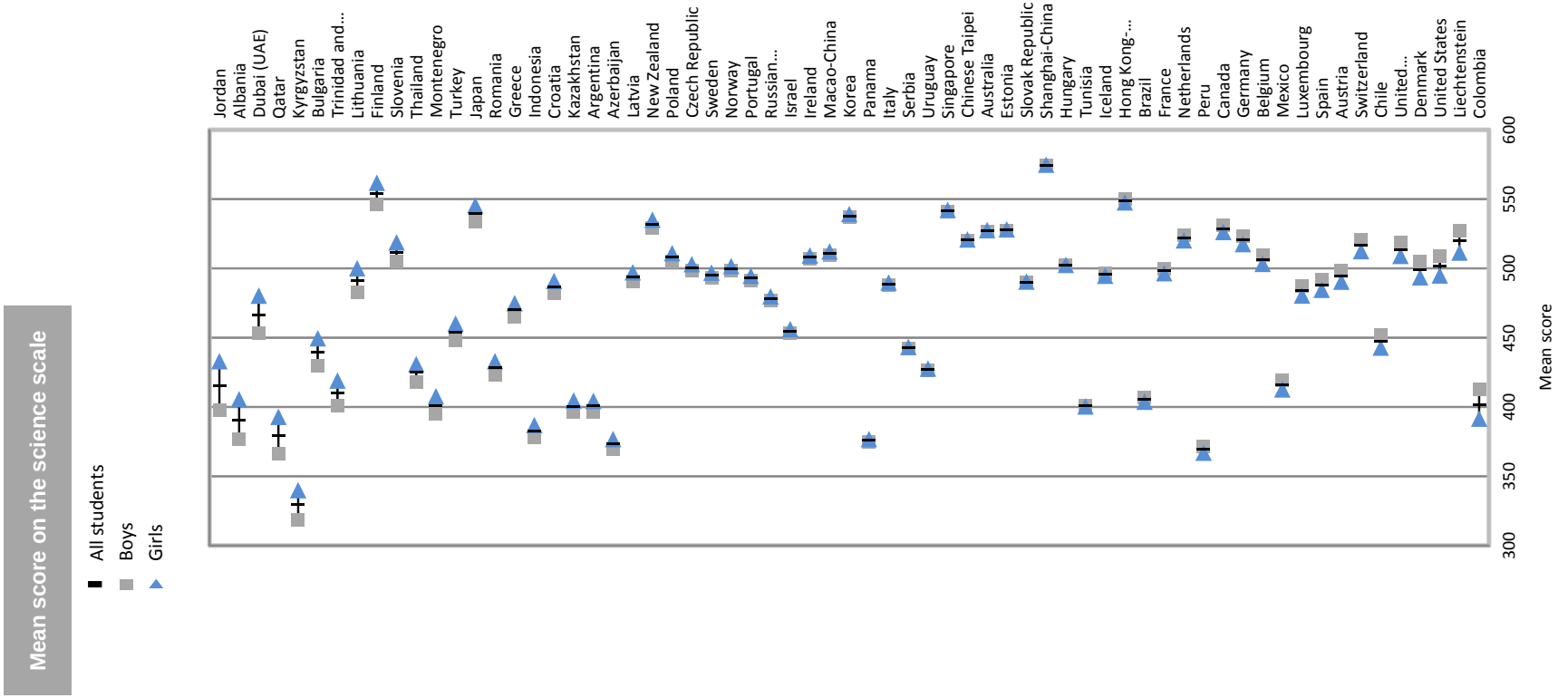
## Figure 3 Gender differences in mathematics performance




Note: Statistically significant gender differences are marked in a darker tone (see Annex A3).
Countries are ranked in ascending order of the score point difference (girls - boys).
Source: OECD PISA 2009 Database, Table I.3.3.

Across OECD countries, gender differences in science performance tend to be small, both in absolute terms and when compared with the large gender gap in reading performance and the more moderate gender differences in mathematics. In most countries, differences in the average score for boys and girls are not statistically significant. In 2006, when science was the main focus of assessment, gender differences were observed in two of the science processes being assessed: identifying scientific issues and explaining scientific phenomena. Across OECD countries, girls scored higher in the area of identifying scientific issues, while boys outscored girls in explaining phenomena scientifically.

## Figure 4 Gender differences in science performance




Note: Statistically significant gender differences are marked in a darker tone (see Annex A3).
Countries are ranked in ascending order of the score-point difference (girls - boys).
Source: OECD PISA 2009 Database, Table I.3.6.

The largest gender differences in favour of boys are observed in the United States and Denmark, with 14 and 12 score points respectively, and in the partner countries Colombia and Liechtenstein, with 21 and 16 score points respectively. In the United Kingdom, Chile, Switzerland, Spain, Luxembourg, Mexico and Canada, boys perform better than girls in science with a difference that ranges from 5 to 9 score points. On the other hand, girls perform better than boys in science in Finland, Slovenia, Turkey and Greece, with a difference of 10 to 15 score points, and in Poland with a difference of 6 score points. In the partner countries Jordan, Albania, Dubai (UAE), Qatar, Kyrgyzstan, Bulgaria, Trinidad and Tobago, Lithuania, Thailand, Montenegro and Romania, which perform below the average, the advantage of girls ranges from 10 to 35 score points. This is also the case for the partner countries Indonesia, Kazakhstan, Argentina, Azerbaijan and Latvia, with a smaller difference that varies between 6 and 9 score points.

### *The evolution of the gender gap in reading between 2000 and 2009*

The gender gap in reading performance did not narrow in any country between 2000 and 2009 and it widened in Israel, Korea, Portugal, France and Sweden, and in the partner countries and economies of Romania, Hong Kong-China, Indonesia and Brazil between 2000 and 2009.

The fact that girls outperform boys in reading is most evident in the proportion of girls and boys who perform below baseline proficiency Level 2. Across OECD countries, 24% of boys perform below Level 2 compared to only 12% of girls. The proportion of girls performing below this level decreased by two percentage points between 2000 and 2009, while the share of low-achieving boys did not change during the period. In nearly all countries where there was a decrease in the percentage of students performing below Level 2, this trend was usually more apparent among girls. In Indonesia, the overall decrease in the percentage of students performing below Level 2 was around 15 percentage points; but while the percentage of girls performing below Level 2 decreased by 21 percentage points, the percentage of boys performing at that level decreased by only 9 percentage points. Similarly, in Peru and Albania, the share of girls performing below Level 2 decreased by 19 and 17 percentage points, respectively, whereas the corresponding share of boys decreased by 11 and 12 percentage points, respectively. In Israel and Brazil, the overall decrease in the share of students performing below Level 2 was also mainly the result of improvements among girls, with 11 and 9 percentage points fewer girls, respectively, performing below Level 2. The decrease in the percentage of boys performing below Level 2 in these countries was more modest, at two and three percentage points, respectively.

No country where there was an increase in the performance of girls is included in the list of countries with the widest gender gaps. However, after the changes in the relative performance of boys and girls in Romania and Israel, the gender gap has become wider in these countries than on average across OECD countries. This is a reverse of the previous trend where the gender gap had previously been narrower. In addition, in countries such as Chile and Poland, the percentage of boys and girls performing below Level 2 decreased by similar amounts, in some countries, such as Sweden, France and Spain, the percentage of students below Level 2 has risen; with the increase particularly pronounced among boys. In Ireland, the Czech Republic and Iceland, only the percentage of boys

with a reading proficiency below Level 2 has risen. In Thailand, on the other hand, it has risen slightly for girls but not for boys.

In most countries, the changes in the percentage of top-performing students, (i.e. those at reading proficiency Level 5 or 6) are quite similar among boys and girls, but in a few countries they differ noticeably. For example, while in Denmark and Romania the decrease in the percentage of top performers was almost identical among boys and girls, it differed in magnitude in Finland, Australia, Canada and Ireland. In New Zealand, only the percentage of top performers among girls decreased significantly, while in the Czech Republic and Germany, only the percentage of top performers among boys decreased significantly.

Although the percentage of top performers increased in Japan and Korea and the partner economy Hong Kong- China to similarly high levels, the increase was very different among boys and girls. In Korea, the increase was the largest when looking at all students, but also when looking separately at boys and girls. Nonetheless, the percentage of top performers increased among girls by more than nine percentage points and among boys by slightly less than five percentage points. In Hong Kong-China, the percentage of top performers among girls increased by more than six percentage points, while it did not change among boys. Similarly, in Japan, this proportion increased by almost five percentage points among girls, more than among boys. Effectively, the gap in the proportion of top performers among boys and girls widened in these countries.

## SECTION II GENDER DIFFERENCES IN THE LABOUR MARKET

Gender differences in the labour market arise only in part because of the dual nature of female work - paid work in the formal labour market and unpaid care in the household. Men and women mostly lead parallel but separate working lives, as gender segregation is a prevailing feature in many working environments in many countries. Segregated labour markets however have major social consequences, as well as important consequences on individuals and on overall gender differences (for example because segregated labour markets are often associated with large wage differentials and differences in working conditions). Just as lack of female participation in the labour market is associated with lower economic growth and development, lack of equal opportunities for men and women to realise their potential in any field of study and work is in fact likely to result in wasted talent and human potential.

PISA offers a unique opportunity to explore not only gender differences in achievement as was done in Section I, but also gender differences in career expectations and the attitudes and motivation that boys and girls have, all factors which may lead to gender differences in outcomes while still at school, in the labour market and in overall levels of well-being.

### *Career Expectations*[1]

Men and women do not choose the same fields of study when they enter tertiary education: women are, in fact, significantly under-represented in fields such as science, technology,

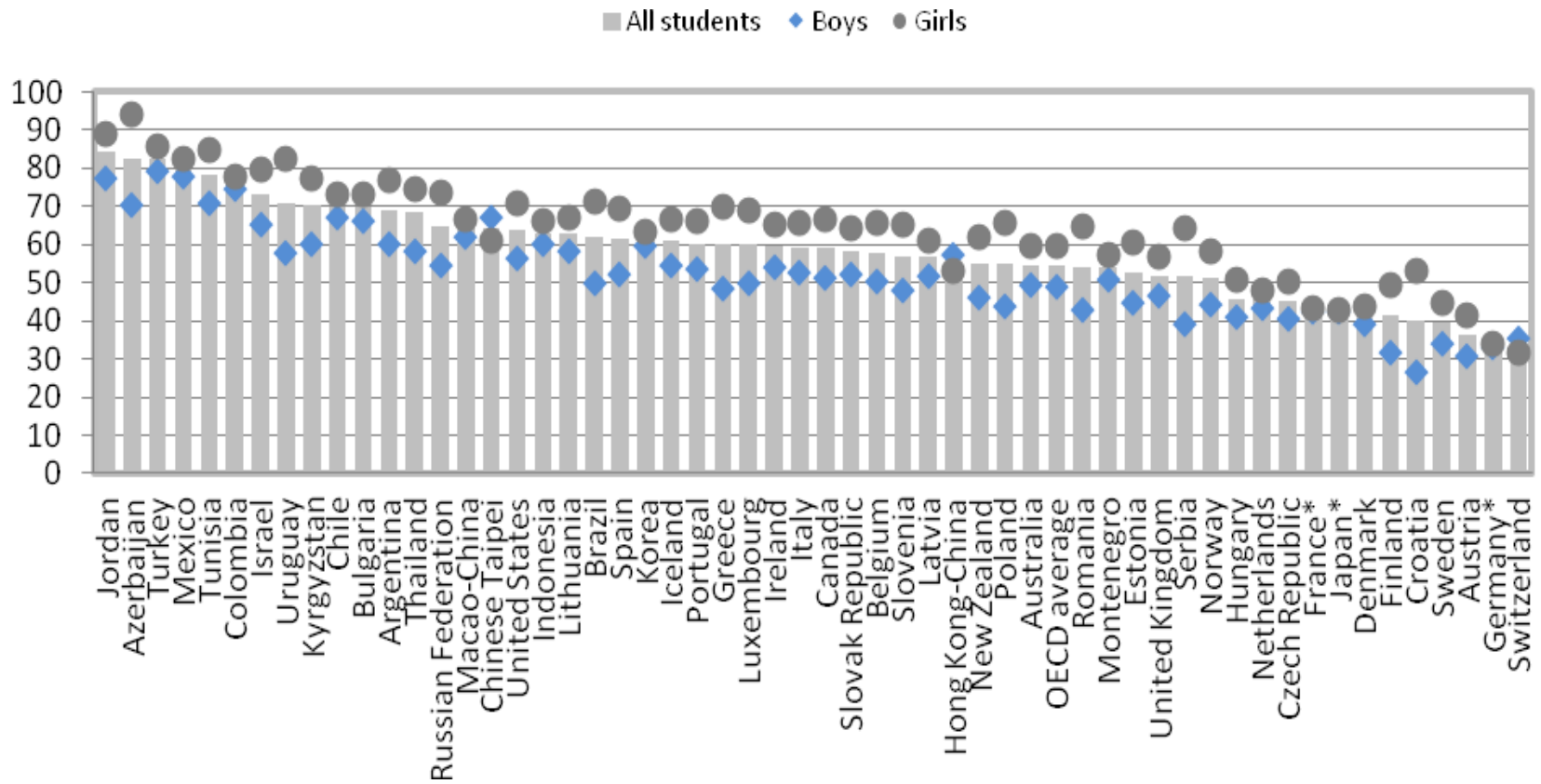
[1] A more extensive analysis of gender differences in career expectations can be found in Sikora & Pokropek, 2011.

engineering and mathematics while they are over-represented in the humanities and medical sciences. As discussed in previous sections, PISA identifies large gender differences in achievement, with girls outperforming boys in reading in all countries and economies, and boys outperforming girls in mathematics, by a smaller margin, in several countries and economies. Gender differences in science are fewer and less pronounced overall, with girls outperforming boys in some countries and boys outperforming girls in others.

In 2006, 15 year-old students were asked what they expected to be doing in early adulthood (age 30). Of the 57 countries that took part in PISA 2006, Qatar and Liechtenstein were excluded because they did not collect information on students' gender. We classified responses to this open-ended question according to the International Standard Classification of Occupations 88 - ISCO88 - (International Labour Office, 1988) and used them to construct scores characterising students' expectations on the ISEI index of occupational status (see OECD, 2011, for a detailed description of the methodology used to classify students' occupational expectations and for a list of expected occupations of students). PISA in fact contains detailed information not only on the fields in which students expect to be working when they are 30, but also on how ambitious their expected career paths are.

Results presented in Figure 5 indicate that girls are more ambitious than boys in almost all PISA-participating countries and economies. On average across OECD countries, girls are 11 percentage points more likely than boys to expect to work as legislators, senior officials, managers and professionals. Japan, Germany and France are the only OECD countries where the proportion of boys and girls aspiring to these occupations are similar, while in Switzerland and the partner economies Chinese Taipei and Hong Kong-China, boys generally hold slightly more ambitious expectations than girls. The gender gap in career expectations is particularly wide in Greece, Poland and the partner countries Brazil, Romania, Azerbaijan, Uruguay, Serbia and Croatia. In all these countries, the proportion of girls expecting to work as legislators senior officials, managers and professionals is 20 percentage points higher than the proportion of boys expecting to work in those occupations (ISCO88 groups 1 and 2).

**Figure 5. Percentage of students who plan to work in ISCO major occupational group 1 & 2, by gender**




Note: Countries are ranked in descending order of the percentage of students who plan to work in ISCO major occupational group 1 & 2.
Countries in which gender differences are not statistically significant are shown with an asterix.
Source: OECD PISA 2006 Database.

Figure 6 presents a selection from the list of occupations that boys and girls expect to work in as young adults. While it contains no information on the rank of particular occupations in each country, it presents a mosaic of careers that are particularly popular among PISA 2006 respondents. It shows the 22 occupations that were among the 10 most popular occupations for boys and for girls, and shows the number of OECD countries and the number of partner countries and economies in which each of those occupations were included the top 10 occupations cited by boys and by girls.

Figure 6 suggests that boys and girls generally expect careers in different fields and that gender differences in career expectations vary greatly across countries. "Medical doctor" is the only occupational title mentioned by boys and girls alike in more than 25 OECD countries. The career of lawyer was chosen by girls in 25 OECD countries and 17 partner countries and economies, but chosen by boys in only ten OECD countries and ten partner countries and economies. Similarly “architects, town and traffic planners” were among the most popular occupations chosen by boys in as many as 13 OECD countries and in two partner countries and economies and by girls in ten OECD countries and two partner countries and economies.

## Figure 6. Selected occupations from the country-specific lists of the ten most popular career choices among students

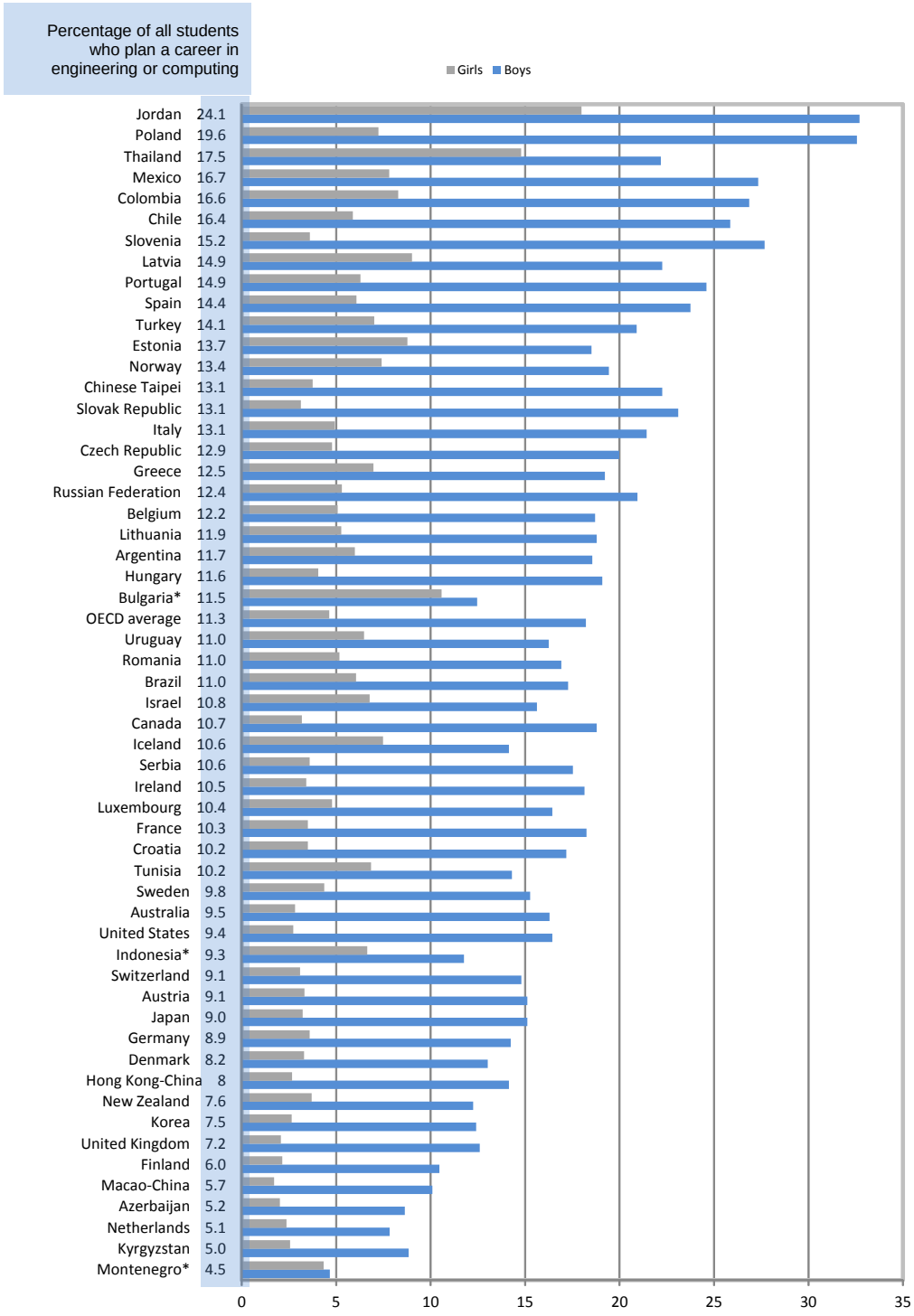
| ISCO code | Boys | Number of OECD countries | Number of partner countries | ISCO code | Girls | Number of OECD countries | Number of partner countries |
|---|---|---|---|---|---|---|---|
| 3475 | athletes, sports persons | 27 | 13 | **2221** | **medical doctors** | 32 | 21 |
| **2221** | **medical doctors** | 26 | 15 | 5141 | hairdressers, barbers, beauticians etc workers | 28 | 10 |
| 7231 | motor vehicle mechanics & fitters | 25 | 6 | **2421** | **lawyers** | 25 | 17 |
| 2140 | architects, engineers | 14 | 11 | 2445 | psychologists | 25 | 10 |
| 5162 | police officers | 14 | 9 | **2451** | **authors journalists & other writers** | 20 | 8 |
| **2141** | **architects town & traffic planners** | 13 | 2 | **3471** | **decorators & commercial designers** | 16 | 8 |
| 5122 | cooks | 12 | 7 | 2230 | nursing & midwifery profess | 13 | 6 |
| 7137 | building etc electricians | 10 | 1 | **2300** | **teaching professionals** | 12 | 10 |
| 7124 | carpenters & joiners | 10 | 0 | 2331 | primary education teaching professionals | 12 | 4 |
| 2132 | computer programmers | 10 | 10 | 2223 | veterinarians | 12 | 5 |
| **2421** | **lawyers** | 10 | 10 | **2141** | **architects town & traffic planners** | 10 | 2 |
| 2130 | computing professionals | 8 | 1 | 3231 | nursing associate professionals | 9 | 2 |
| 2131 | computer systems designers & analysts | 7 | 5 | **2320** | **secondary education teaching professionals** | 7 | 3 |
| **2411** | **accountants** | 6 | 5 | 2332 | pre-primary educ. teaching professionals | 9 | 1 |
| 2149 | architects engineers | 6 | 11 | 3226 | physiotherapists etc associate professionals | 7 | 0 |
| 3121 | computer assistants | 6 | 1 | 5220 | shop salespersons & demonstrators | 6 | 2 |
| 1310 | small enterprise general managers | 6 | 11 | **2411** | **accountants** | 5 | 9 |
| **2300** | **teaching professionals** | 6 | 5 | 3320 | pre-primary education teaching associate professionals | 5 | 0 |
| 7136 | plumbers & pipe fitters | 5 | 1 | 4100 | office clerks | 4 | 3 |
| **2451** | **authors journalists & other writers** | 4 | 0 | 5131 | child-care workers | 4 | 0 |
| **3471** | **decorators & commercial designers** | 4 | 1 | 2211 | biologists, botanists zoologists etc professionals | 3 | 3 |
| **2320** | **secondary education teaching professiona** | 4 | 2 | 2321 | sec. teachers, academic track incl. middle school | 4 | 6 |

Source: OECD PISA 2006 Database.

While decades ago girls were not expected to perform well in science in comparison to boys, in recent years, girls in many countries have caught up with or even overtaken their male peers in proficiency in science. Better science performance among girls, however, does not necessarily mean that girls will want to pursue science-related careers more than boys.

Figure 7 shows the proportion of boys and girls who plan to enter engineering and computing careers while Figure 8 shows the proportion of boys and girls who plan to enter health science-related careers (see OECD, 2011 for a list of careers that are classified as engineering and computing and for health science-related careers). Careers in engineering and computing attract relatively few girls. On average among OECD countries, less than 5% of girls contemplate embarking on this path of employment. This is remarkable, especially because the definition of computing and engineering extends to include fields like architecture, which is rarely considered to be a quintessentially "masculine" job. There is much cross-country variation in the numbers of students opting for future employment in this field, ranging from relatively high proportions in Poland, Slovenia, Mexico, Jordan and Colombia, to very low numbers in the Netherlands, Finland, Azerbaijan and Montenegro.

## Figure 7. Proportion of boys and girls planning a career in engineering or computing



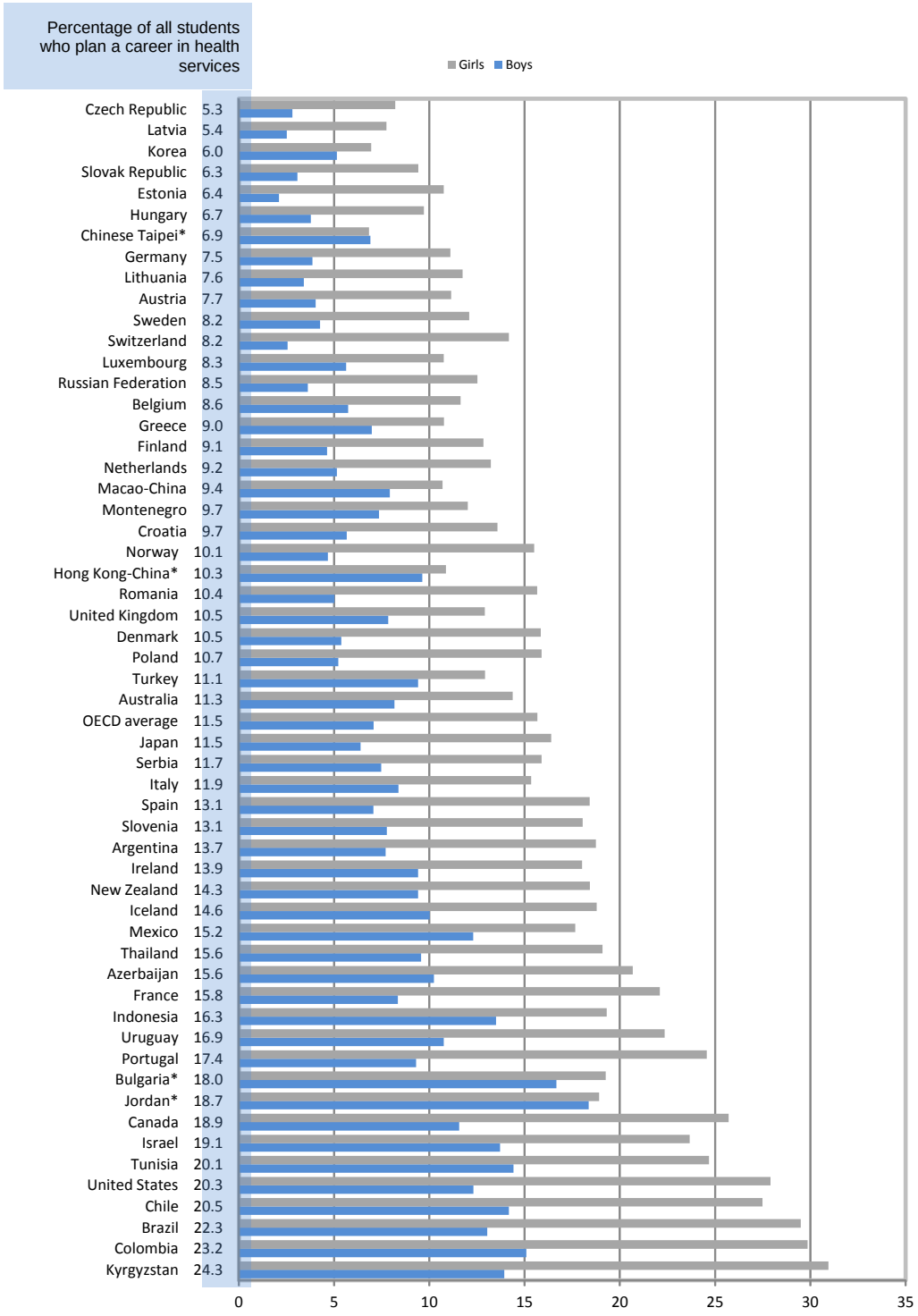

Note: Countries are ranked in descending order of the percentage of all students who plan a career in engineering or computing (including architecture).
Countries in which gender differences are not statistically significant are shown with an asterix.
Source: OECD PISA 2006 Database, Table 6.

Yet, the most striking feature of these distributions is that in exceptionally few countries does the number of girls selecting computing and engineering as their future career exceed the number of boys contemplating such a career. The only exceptions to this rule are Montenegro, Bulgaria and Indonesia. Moreover, the ratios of boys to girls are quite large in most OECD countries and in many partner countries and economies. On average, there are almost four times as many boys as girls expecting employment in engineering and computing in OECD countries and close to three times as many boys as girls in partner countries and economies.

The pattern of preferences for health-science careers by gender is a mirror image of the expectations related to employment in engineering and computing. Just as boys outnumbered girls in their enthusiasm for computing and engineering, girls who opt for a career in health and medicine outnumber boys, without exception. This pattern holds even after nurses and midwives are excluded from the list of health-related careers, so the gender imbalance in preference for health-related careers is not solely the result of the traditional over-representation of women in nursing and midwifery.

On average across OECD countries, girls are 9 percentage points more likely to anticipate working in health services – excluding nurses and midwifes - than boys (16% of girls expect a career in health compared to only seven % of boys). Girls in Austria, Norway, Switzerland and in the partner countries of Thailand, Latvia, and the Russian Federation are more likely to anticipate a career in health than boys. In contrast, girls and boys in Mexico, Korea, Italy, the partner countries of Bulgaria and Indonesia and the partner economy of Hong Kong-China hold similar expectations of a career in health.

## Figure 8. Proportion of boys and girls planning a career in health services



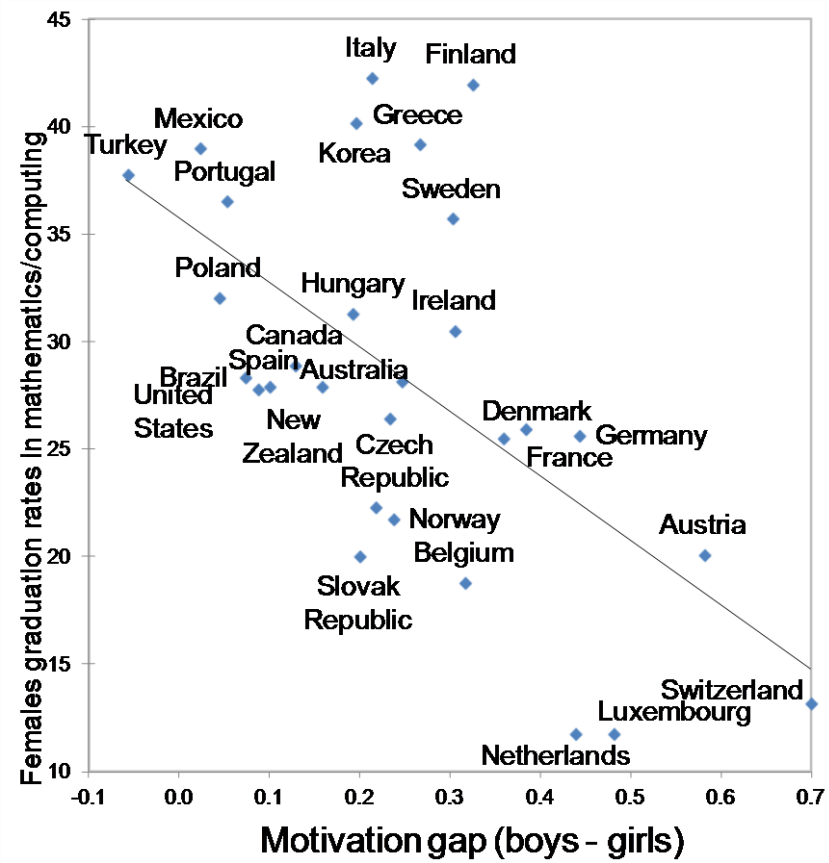

Note: Countries are ranked in descending order of the percentage of all students who plan a career in health services (without nurses and midwifes).
Countries in which gender differences are not statistically significant are shown with an asterix.
Source: OECD PISA 2006 Database, Table 7.

This imbalance is strikingly similar for the highest achieving students. Top performing girls and boys have almost identical career preferences as their peers who perform less well. While PISA data show that girls are generally more ambitious than boys and that higher performing students are more ambitious than poor perfrming students, expectations of careers in different fields are driven by diverse factors that do not always relate to their actual skills.

### *Student attitudes and motivation*

In countries where boys and girls are equally motivated to learn mathematics, the share of female students in mathematics and statistics is higher than in countries where girls are less motivated than boys to learn math. In countries like Turkey, where there is almost no difference among boys and girls in their motivation to study mathematics, the share of female graduates in mathematics and statistics is close to 40% (see Figure 9). On the other hand, in Switzerland boys report much higher interest in learning mathematics and there are relatively few female students graduating in related subjects.

**Figure 9 Gender gap in motivation**




Source: Chart A3.5, Education at a Glance 2007, OECD; OECD PISA 2006 database.

Recent research suggests that in more gender-equal societies, cognitive gender gaps in mathematics are smaller and that similar gaps in reading are even more evident. In countries where the value of The World Economic Forum's Gender Gap Index (GGI) shows a relatively favorable position of

females, gender gaps in mathematics are less visible (Guiso et al., 2008). According to this research, if Turkey would have the same level of gender equality as Sweden, the evidently lower mathematics performance of Turkish girls would completely disappear. At the same time, countries with more gender-equal culture show an even higher performance of girls in reading, without noticeable improvement among boys. In fact, in many countries low reading achievement of boys is already much more worrying.

### *Gender differences in attitudes and reading habits*

Girls greatly outnumber boys among students who read for enjoyment. On average across OECD countries, 74% of girls read for enjoyment daily, while only 54% of boys do so – a gap of 20 percentage points. The gap between boys and girls widened between 2000 and 2009 by three percentage points across the OECD area (see Table 1). For example, in 2000, 60% of boys and 77% of girls read for enjoyment; by 2009, these percentages had decreased to 54% and 74%, respectively. Interestingly, the widening of the gender gap was due to the fact that while, on average, a smaller percentage of boys and girls read for enjoyment in 2009 than in 2000, the decline is greater among boys than it is among girls. In other words, boys showed a greater decline in reading than girls did. The evolution of the gender gap in reading for enjoyment between 2000 and 2009 varies substantially across countries. While in most countries the proportion of boys who read for enjoyment decreased between 2000 and 2009, the trend among girls is less consistent.

Across all 38 countries with valid results in both the 2000 and 2009 reading assessments, only two countries show an increase in the proportion of boys who read for enjoyment. In Japan, the share of boys reading for enjoyment increased by nine percentage points, while in the partner economy Hong Kong-China it increased by five percentage points. In Japan, this increase was even greater among girls and was thus accompanied by a widening of the gender gap. In Hong Kong-China, boys and girls increased their reading habits similarly and therefore the gender gap remained stable at around eight percentage points. In 11 countries, including the OECD countries Belgium, Canada, Germany, Greece, Hungary, Israel and the United States, the proportion of boys who read for enjoyment did not change. In 25 countries, the proportion of boys who read for enjoyment has decreased since 2000. Portugal, the Czech Republic, Chile and the partner country Latvia are countries with the largest decrease. In these countries, the percentage of boys who read for enjoyment decreased by 15 percentage points or more, and now stands between 44% and 55%. Among other countries that saw a decrease in the percentage of boys reading for enjoyment, this percentage now stands at 50% or less in Switzerland and the partner countries Argentina and Liechtenstein, and at 55% or less in Iceland, Finland, France, Italy, Spain, Australia, Ireland, Sweden and Norway.

The percentage of girls who read for enjoyment decreased in 17 countries. In the Czech Republic, Portugal, Ireland, Switzerland, and the partner country Argentina, this proportion decreased by 11 to 13 percentage points and is now close to 70%, except in Portugal, when the overall percentage is close to 80% – well above the OECD average of 74%. In 12 other countries, the percentage of girls who read for enjoyment decreased by up to 10 percentage points. The share of girls reading for enjoyment remained unchanged in 13 OECD countries. In eight countries, the

proportion of girls who reported reading for enjoyment increased. It is now above 80% in Greece and Canada, and the partner countries and economies Bulgaria, Hong Kong-China, Indonesia, Albania and Thailand, while despite the largest increase it is still below 60% in Japan.

## SECTION III TRENDS IN THE GENDER GAP AMONG DISADVANTAGED AND LOW PERFORMING STUDENTS

There is a widespread notion that reading skills deteriorated even more among boys coming from unprivileged background between 2000 and 2009. PISA offer a unique opportunity to analyze such trends by comparing changes in reading performance separately for disadvantaged and advantaged students. Disadvantaged students are defined here as those with values of the PISA index of economic, social and cultural status (ESCS) below 33$^{rd}$ percentile in each country. In other words, these are students who constitute bottom third of families with the lowest educational attainment, occupational status, cultural resources and consumption goods, in each country. Similarly, advantaged students constitute the top third of students with the highest level of economic, social and cultural status. In addition to this distinction, we also compare changes in performance among the lowest- and the highest-performing students, namely, those performing at the 10$^{th}$ and 90$^{th}$ percentile of performance distribution in each country. As socio-economic background and performance are highly correlated, changes among disadvantaged students are similar to changes among the lowest-performing students. We use both categories as it is sometimes easier to statistically detect or confirm changes in one or other category of students.

On average in OECD countries the performance of boys declined slightly with greater negative trends among higher-performing and socio-economically advantaged boys (see Table 2 for detailed results). Thus, in general the view that boys with unprivileged background are falling farther behind is not confirmed by the data. On average across OECD countries, only the performance of disadvantaged or low-performing girls improved. These two effects have a similar impact on the gender gap in performance, which increased by around 6 to 7 score points for both disadvantaged and advantaged students, and for both low- and high-performers. However, while among disadvantaged students this change was driven by greater improvements among girls, for advantaged students this change was caused by a greater decline in performance among boys. Obviously, this general trend varies across countries.

In France, Iceland and Sweden the performance of disadvantaged and low-performing boys declined substantially by 20 to almost 40 score points. This negative trend was accompanied by a much smaller decline in performance among girls. Only in Sweden did the performance of advantaged students also decrease, but to a lesser degree; while in France and Iceland performance of the top performing students remained unchanged. In the Czech Republic and Canada, only the performance among advantaged boys decreased, while the performance of other groups of students remained similar. This negative trend for advantaged boys is clearly visible in the Czech Republic where the gender gap increased by 20 score points among advantaged students and remained similar for other groups.

In Poland and Portugal the performance improved amongst the lowest-performing students with much larger improvements among girls. As a result, the gender gap among disadvantaged students

increased in Portugal. In Hungary, greater improvements were observed only among disadvantaged low-performing girls, with no significant change for other groups of students. Similarly in Mexico, performance improved only among disadvantaged girls, with a resulting increase in the gender gap among disadvantaged students by 11 score points.

Chile and Germany are the only countries where performance improvements were equally shared among boys and girls. In both countries greater improvements were observed among disadvantaged students. Chile is a country with a relatively small gender gap and performance improvements are equal for both boys and girls. In Germany, only the lowest-performing students improved, with the highest-achieving students performing at similar levels in 2000 and 2009. There was no relationship to gender in regards to this positive trend.

In Korea trends are clearly different with visible improvements among girls and top-performing boys and no change among low-performing or disadvantaged students. This has resulted in a large increase in the gender gap by around 30 score points, among the lowest performing and disadvantaged students. On the other hand, performance variation in Korea is still below average and the performance levels of disadvantaged students, including boys, are much higher than in other countries.

In several countries performance declined among disadvantaged or low-performing students, but there is no clear pattern of gender differences in this negative trend. In Ireland, Finland, Australia or Spain, performance declined for boys and girls despite their socio-economic background.

## CONCLUSIONS

Gender differences cannot be fully addressed by separate policies focusing on gaps present in schools or labour markets alone. Evidence suggests a multifaceted relationship between gender gaps found in school and those among adults; where the effects of educational, employment and family policies interact in a complex manner. An effective gender-equalising policy should deal with all these aspects.

Gender gaps in schools are more evident when looking at top performers in mathematics and low performers in reading. In many countries gender gaps in mathematics or science are small on average, but boys are more frequent among top achievers in these subjects. Policy decisions should aim at encouraging talented girls to study mathematics and science at the most advanced levels.

Lack of reading skills among low performing boys is even more worrying as girls catch up in other subjects. In almost all of the countries studied boys outnumber girls in terms of their low basic reading skills. Policies aiming at helping boys to acquire reading skills are especially needed among those with basic reading problems.

Career preferences and motivation seems to be more important than achievement for future choices of students. Even top-skilled girls at age 15 rarely opt for engineering or computing. In countries where girls report high motivation to study mathematics, graduation rates in related subjects tend to be more similar for men and women. This evidence suggests that achievement-focused policies will not change the relative disadvantage of women in labour markets. School level policies aimed at attracting girls to mathematics and science as future career options should be part

of more general policies that try to change traditional views on the role of women as professionals. These need to be supported by employment and family policies that help women to sustain their professional career despite other obligations and unfavourable labour markets practices.

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[i] Comprehensive public-support systems or flexible workplace practices are ways to help parents combine childrearing and paid employment (OECD, 2007).

[ii] Goldman Sachs (2009) estimated that the labour force growth implied by a narrowing of the gender gap in formal labour-force participation would translate into incremental gains in GDP and per capita GDP growth rates. The more women participate in the formal labour market, the more creativity, innovation and skill enter the market, strengthening economic performance.