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GENDER GAP IN MATHEMATICS AND IN READING: A WITHIN-STUDENT PERSPECTIVE

LA BRECHA DE GÉNERO EN MATEMÁTICAS Y EN LECTURA: LA PERSPECTIVA DEL ESTUDIANTE

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RESUMEN

La brecha de género en matemáticas, que favorece a los chicos sobre las chicas en clase, ha adquirido cada vez más importancia en las últimas décadas. Teniendo en cuenta que la competencia matemática es crítica para las carreras STEM y para integrarse adecuadamente a través de profesiones relacionadas con las matemáticas en el mercado laboral, esta brecha es una fuente de preocupación social. Se ha debatido ampliamente la existencia y el origen de esta brecha de género. Los investigadores que representan un enfoque socio-cultural han resaltado el hecho de que se ha ido reduciendo a lo largo de los años, así como su variabilidad entre países y la correlación entre la amplitud de la brecha y los diferentes factores socio-culturales, es decir, las medidas de desigualdad de género por país, para desmontar las explicaciones basadas en diferencias biológicas. Sin embargo, a pesar de las docenas de publicaciones sobre el tema, la cuestión parece estar lejos de resolverse.
La brecha inversa en lectura se ha documentado de forma consistente comparando países y edades. La brecha que favorece a las chicas ha recibido, sin embargo, menos atención, aun cuando la competencia lingüística es tan crucial para la carrera profesional y el mercado laboral como las matemáticas. La comparación de las brechas de género en lectura y en matemáticas ha mostrado que están muy correlacionadas entre países y a lo largo del tiempo, y que existe un orden de rango consistente por su magnitud. Más aún, cuando la brecha en matemáticas de reduce, normalmente la brecha inversa en lectura aumenta. Debido a esta reciprocidad, en todas las circunstancias, incluso cuando las chicas tienen mejor rendimiento que los chicos en matemáticas, las chicas tienden a tener mejor rendimiento en lectura que en matemáticas y los chicos tienden a hacerlo mejor en matemáticas que en lectura.
En este estudio, se ha realizado un enfoque comparativo para explorar la relación mutua de las brechas en matemáticas y lectura de manera integradora, aplicando la perspectiva intra-grupo al nivel personal. Utilizando los datos de PISA 2012 de alrededor de medio millón de estudiantes de 15 años, procedentes de 10 000 centros educativos de 63 países, hemos examinado la diferencia entre estudiantes entre el rendimiento en matemáticas y lectura, además de una serie de correlatos potencialmente explicativos. De entre docenas de factores personales y escolares, el género se identificó como el predictor más dominante de la diferencia entre estudiantes. Los resultados fueron consistentes en la comparación internacional, y pueden explicar la persistencia de estereotipos de género en el rendimiento de matemáticas y en la menor representación de las mujeres en carreras relacionadas con STEM.

Palabras clave: PISA, Brecha de género en matemáticas, Brecha de género en lectura, Educación comparada

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ABSTRACT

The gender gap in maths favouring boys at school has gained considerable attention throughout the last decades. Since maths skills are critical for STEM academic studies and for properly integrating in math-related occupations in the labour market, this gap is a source of social concern. The existence and origin of this gender gap have been highly debated. Scholars representing socio-cultural approaches have emphasized the fact that it has been narrowing along the years, and also its variability across countries, and the correlation between the extent of the gap and various socio-cultural factors, such as measures of country's gender inequality, to debunk biologically based explanations. However, despite dozens of publications the issue seems far from resolved.
The reverse gender gap in reading has been documented consistently across countries and ages. The gap favouring girls has received less attention although language skills are as crucial for workforce success as maths. Comparing the gender gaps in reading and in maths revealed that the two gaps are highly correlated across countries and over time and that there is a consistent rank order in their magnitude. Accordingly, when the gap in maths would get smaller, usually the reverse gap in reading would get larger. Due to this reciprocity, in all circumstances, even when girls outperform boys in maths, girls tend to perform better in reading than in maths and boys tend to perform better in maths than in reading.
In this study a comparative approach was used to explore the gaps in maths and reading mutually and comprehensively by applying the within-group perspective to the personal level. Using PISA 2012 data on about half a million 15 year old students and 10 thousand schools in 63 countries, we examined the intra-student difference between achievements in maths and reading and a series of potential explanatory correlates. Out of dozens of individual and school factors, gender was identified as the most dominant predictor of the within-student difference. The results were consistent across countries and may explain the persistence of gender stereotypes regarding maths performance and the under representation of women in STEM.

Key words: PISA, Gender gap in maths**,** Gender gap in reading**,** Dimensional Comparison Theory

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1. INTRODUCTION

1.1. THE GENDER GAP IN MATHS

The achievement gap between boys and girls in maths, in favour of boys, has always been considered with a particular interest. Since achievement at school is considered a predictor of later achievements in life and has a direct link to later educational and career choices of young men and women, gender gap in maths has been regarded as one of the contributing factors of the underrepresentation of women in STEM fields - Science, Technology, Engineering and Mathematics (Burelli, 2008; Ceci et al., 2009; del Pero & Bytchokova, 2013; Else-Quest et al., 2010; Lavy & Sand, 2015; Park et al., 2007; Smith et al., 2013; Stoet & Geary, 2015; Thoman et al., 2014; Wang et al., 2013).

A large quantity of research dealing with maths gender gap at school has been published throughout the last few decades trying to answer the question: does a gender gap in maths achievement really exist, and if so, what could be its source? (Ceci et al., 2009; Ceci & Williams, 2010; Eagly & Wood, 2013; Halpern et al., 2007; Hyde et al., 1990; Hyde et al., 2008; Lindberg et al., 2010; Schmidt, 2011; Valla & Ceci, 2011). The literature reveals a wide debate about the possible source. One side of this controversy emphasizes innate, biological factors. According to this approach, boys tend to be naturally better than girls in maths and quantitative reasoning in general (Berenbaum & Resnick, 2007; Berenbaum et al., 2008; Bowers et al., 2013; Gallagher et al., 2000; Geary, 1996, 2010; Ingalhalikar et.al., 2014; Kimura, 1999). The other side emphasizes socio-cultural factors, such as parents' and teachers' biased attitudes toward girls (Mosconi, 2011), social expectations with a resultant stereotype threat and weakened motivation of girls to familiarize themselves with maths (Else-Quest et al., 2010; Kane & Mertz, 2012; Nosek, et al., 2009; Schmidt, 2011; Spelke, 2005).

The answers to these questions are contradictory as the results are inconsistent. On the one hand, a significant gap in maths favouring boys is traditionally documented and is apparent in certain large- scale assessment studies such as PISA[1] (OECD, 2014, 2015). On the other hand, there are many indications that the gap varies in magnitude across countries and cultures, and that it has been narrowing or has essentially disappeared along the last decades (Brody & Mills, 2005; Ellison & Swanson, 2010; Else-Quest et al., 2010; Hyde, 2005; Hyde & Linn, 1988; Hyde et al., 2008; Lindberg et al., 2010; Wai et al., 2010). This variability and the narrowing gap was used by many scholars to demonstrate the importance of socio-cultural factors and to weaken the supposed role of genetic factors in creating the gap (Penner, 2008). Valla and Ceci (2011) stated that "such dramatic changes over such a brief time period are inconsistent with mathematical ability tightly controlled by biology." In order to strengthen socio-cultural explanations researchers attempted to identify socio-cultural and environmental characteristics that can explain the variance in the gender gap and can trace its underlying causes. For example, scholars have revealed that the gap is highly correlated with culturally-specific gender stereotypes (e.g. Nosek et.al. 2009; Nosek & Smyth, 2011) and with measures of gender equity applied in the society. Guiso et al. (2008) reported an across countries correlation between various measures of gender equality[2] and the extent of the gender gap in maths in PISA 2003, indicating that girls' underperformance in maths relative to boys is eliminated in more gender-equal cultures. These findings were later used to support the gender stratification hypothesis according to which gender inequalities in educational and economic opportunities basically shape socialization processes that in turn affect gender gap in maths (Baker & Jones, 1993; Else-Quest et al., 2010). Other socio-educational factors at the national level were used as potential explanations of gender gap in maths such as a country's schooling system – co-

[1] PISA - Program for International Student Assessment, an educational study of 15 years old students administered in more than 60 countries, conducted every three years. See method chapter for more details.

[2] Guiso et.al checked the GGI – The World Economic Forum's Gender Gap Index – a composite, weighted measure that reflects economic and political opportunities, education, and well-being for women and also three other measures of gender equality at the country level: An index of cultural attitudes toward women; The rate of female economic activity; The political empowerment index. Guiso et al. had found that all four measures were highly correlated and hence in their work they concentrated on the GGI.

educational or separate schools for girls and boys (Fryer & Levitt, 2010; Phalke et al., 2014), or a specific religion. However, the majority of these explanatory models have been debunked by Kane & Mertz (2012). They inferred that the general wealth and economic prosperity of a nation contributes both to the gender gap in maths and the degree to which the citizens of these countries exhibit implicit gender-science stereotypes. Subsequently, some researchers have expressed scepticism about Guiso et al.'s findings and about the validity of such socio-cultural explanations (Reilly, 2012; Stoet and Geary, 2013, 2015). Breda, Jouini and Napp, (2018) related gender gaps in maths to societal inequalities that are not directly related to gender.

1.2. THE GENDER GAP IN READING

Contrary to the findings in the field of the maths gender gap, studies conducted during the past few decades have documented the existence of a gender gap favouring girls in verbal skills in general, and more specifically in reading (Cole, 1997; Lietz, 2006; Maccoby & Jacklin, 1974). Gender gap in reading is found across different ages, countries, languages and cultures. It manifests itself in different types of tests and measurement approaches. For example, in PISA and PIRLS[3] tests, a gender gap in favour of girls exists in practically all participating countries and in all test cycles (e.g. OECD, 2010, 2014; Mullis et al., 2012). However, despite the robustness and universality of this empirical phenomenon, and despite the fact that in many respects the gender gap in reading mirrors the gender gap in maths, the reading gap has been of relatively little concern among scholars, policy makers and the general public. Far fewer publications deal with it and it seems that there is no serious debate regarding the origins of this gap. Boys' lower performance in reading gets much less attention or is completely neglected by the literature compared to the focus on girls' disadvantage in maths (Stoet & Geary, 2013, 2015). The reason for this dearth of interest is unclear. It may be attributed to the high consensus among researchers regarding the biological sources of the gender gap in reading (e.g. Harasty et al., 1997). It is also possible that while maths has always been regarded as a critical filter that prevents women from properly integrating into the labour market (Sells, 1973, Gallagher & Kaufman, 2005; Niederle & Vesterlund, 2010) language skills are regarded as less crucial to success in life[4]. Finally, another explanation could be that disparities favouring girls are less likely to evoke gender discrimination and equality sensitivities and as such are of less interest to the research community and the public.

1.3. GENDER GAPS IN MATHS AND READING ARE INVESTIGATED AS SEPARATE ISSUES

Except for few publications (e.g. Guiso et al., 2008; Stoet & Geary, 2013, 2015) a prominent characteristic of gender gap research in maths and in reading is that they have been investigated in isolation, separately from the question of achievements and gender gaps in other subjects at school. National and international large-scale assessment programs traditionally report gender gaps in various school domains in different chapters or volumes. Thus, gender gap in maths and reading (or other school domains) are usually not compared to each other and no serious attempt has been made to explore the reciprocity between them. However, since these domains are studied and assessed in the same context and environment (i.e. same schools and educational systems) and by the same students, it is important to investigate these gender gaps also mutually. Another rationale to explore them together is that reading (or language skills in general) is considered the basis for most academic activity at school, including in maths (Estyn, 2008). As such, it can be seen as representing the general academic level of students at school.

[3] PIRLS - Progress in International Reading Literacy Study. An educational study administered in about 50 countries, assessing reading literacy among 4th grade students, conducted every five years by the IAEA (International Association for Educational Assessment).

[4] In the last decades, however, it seems that this view is changing with more and more educators acknowledging written and oral communication skills as critical for workforce success in the 21st century.

1.4. RECIPROCITY BETWEEN THE GENDER GAPS IN MATHS AND READING

The review of the literature has revealed two important attributes of the relationship between the gaps in maths and reading which seem to have slipped from view and from discussion. The first is that the gaps are highly correlated and the second is a consistent rank order in their magnitudes.

Across countries, a strong correlation between the gender gaps in maths and in reading is documented. The correlation ranges between 0.60 and 0.78 (Guiso et al., 2008; Marks, 2008; OECD, 2012; Stoet & Geary, 2013, 2015). Figure 1 presents the scatterplot of gender gaps in maths and in reading in PISA 2012 (OECD 2015). This correlation signifies that countries where girls tend to do as well as, or better, than boys in maths, are the same countries where girls tend to do particularly well in reading as compared to boys. For example, in Finland, girls performed as well as boys in maths and they scored 62 points higher in reading than boys. In Arab countries, where a significant girls-to-boys gender gap in maths was documented, an extremely large gender gap in reading was found (Fryer & Levitt, 2010; Rapp, 2015; Stoet & Geary, 2015). On the other hand, in Chile, where the gender gap in reading was narrowest (girls score 23 points higher than boys in PISA 2012), the widest negative gender gap in maths was found (girls score 25 points lower than boys).

As across countries, the magnitude of the two gender gaps seems to be synchronized also over time - that is - over grades and years of measurement. Accordingly, when the gender gap in reading favouring girls gets larger, the gap in maths in favour of boys tends to get narrower and vice versa (Rapp, 2015). For example, the trends of the PISA gender gaps, between 2003 and 2012, presented in figure 2, indicates that countries in which girls improved in maths with respect to boys between 2003 and 2012 were also usually the same countries in which girls became better readers compare to boys during the same period (OECD 2015).

This co-variation between the gender gaps in maths and in reading is crucial to the understanding of the gender gap in maths[5]. It means that if there are socio-cultural factors that influence the improvement of girls' achievement in maths they probably influence also their improvement in other academic school domains (reading included). Unfortunately, even when this co-variation was reported in the literature, its consequences were not explicitly expressed. The exact interpretation of the research should have been that there are some socio-cultural factors that are related to girls' academic level in general. The influence includes maths but it is not exclusive to it. This is an important distinction. The question of what factors could explain or what could improve girls' maths achievement as such, has yet to be addressed.

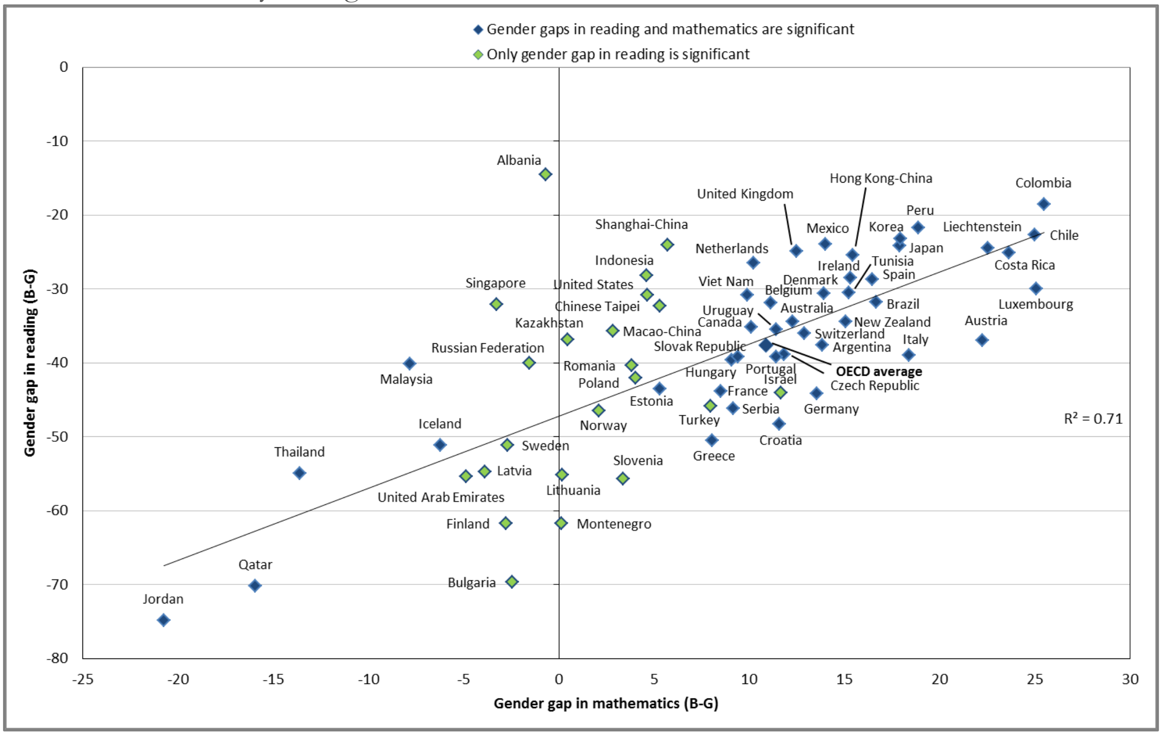
The second attribute of the relationship between the gender gaps is their steady rank order. The gap (in favour of girls) is always most prominent in reading and it is smallest (or the most negative) in maths (see for example OECD 2014, 2016). For the purpose of demonstration, figure 3 presents side by side the gender gaps by country in maths, science and reading in the PISA 2012 cycle. As can be seen, boys are, in most countries, better in maths than girls, and in all countries, girls are better in reading than boys. The gender gap in science is situated somewhere in the middle – usually it is narrower than the gap in reading but larger (or less negative) than the gap in maths[6]. A similar rank among the gender gaps in the various subjects can be observed when comparing the international PIRLS 2011 (reading literacy) data and TIMSS[7] 2011 maths and science data of 4th grade same students (Martin et al., 2012; Mullis et al., 2012, Rapp, 2015).

[5] Obviously, the co-variation between the gender gaps in maths and in reading in standardized tests at school results from a correlation that exists primarily between the achievement levels in the two domains (see appendix 1 for possible explanations for this primary correlation).

[6] Apparently, this is because science is composed of a few subjects some of which are more mathematically modelled (e.g. physics) while others are more linguistic (biology).

[7] TIMSS – Trends in International Mathematics and Science Study. An educational study administered in about 60 -70 countries, assessing the mathematics and Science achievement level of 8th and 4th graders, conducted every four years by the IAEA.

Figure 1. Cross-country variation in gender gaps in maths and reading in PISA 2012 Score-point difference between boys and girls.



Source: OCDE, 2015

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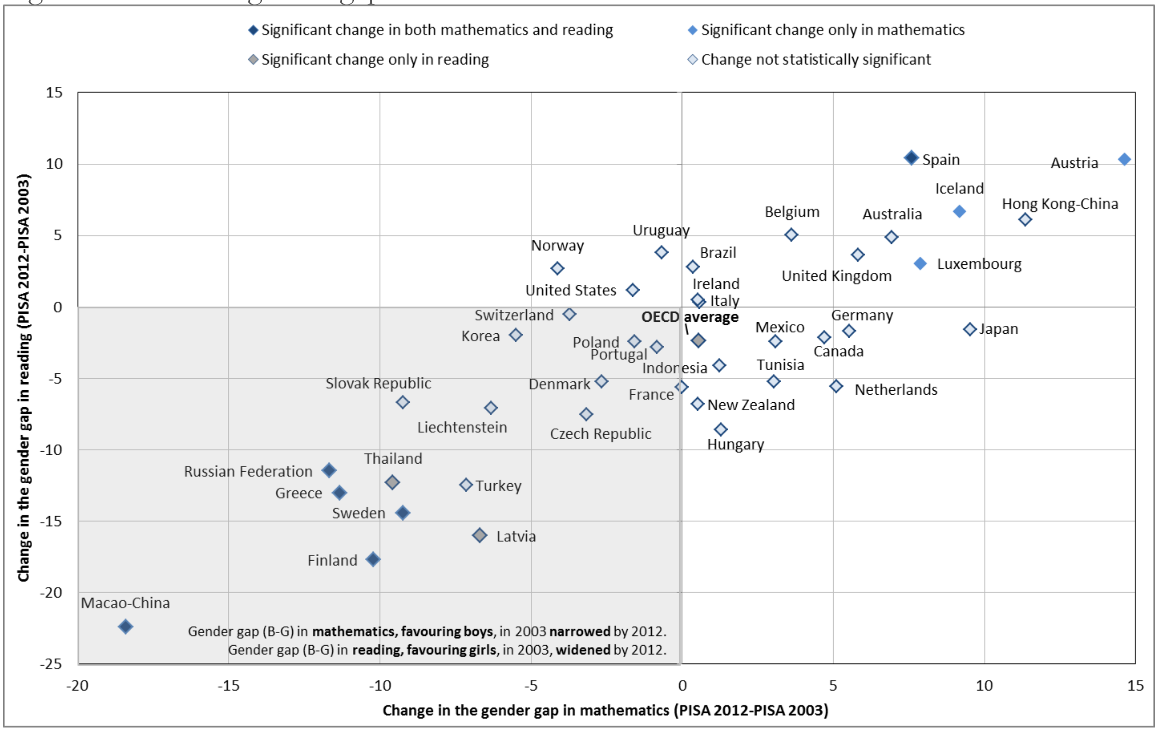
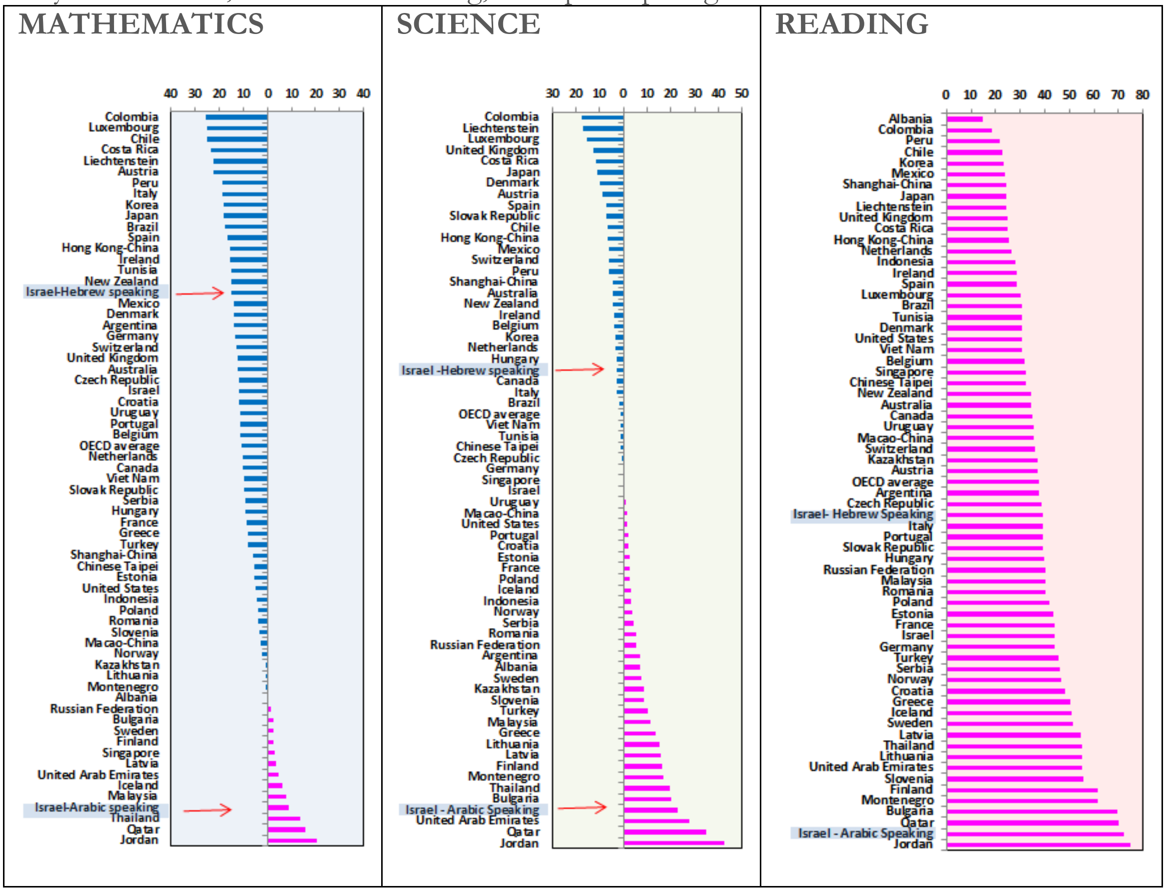
Figure 2. Trends in gender gaps in maths and between PISA 2003 and 2012



Source: OCDE, 2015

This rank among the gaps is preserved in most of the countries irrespective of the general level of achievement in a given country or whether or not boys outperform girls in maths. It is found also within countries, in different sectors of populations, such as ethnic groups (Rapp, 2015) and socio-economic groups (e.g. del Pero & Bytchkova, 2013). Interestingly, it is observed also in marks at school. Voyer & Voyer 's (2014) meta-analysis of school marks shows that girls tend to have better marks at school than boys in all reported school domains. However, the gap towards girls is largest in the "first language" domain and narrowest in maths.

Figure 3. Gender gaps (score-point differences between girls and boys) in PISA 2012 in three literacy areas: maths, science and reading, in all participating countries[8].



Source: OCDE, 2015

The steadiness of rank order is clearly in accordance with, or reflects the co-variation in the gender gaps since this co-variation determines that whenever one gap changes, the other changes too in the same direction, which in turn preserves the rank order of the gender gaps. One might be causing the other or they both might be expressing the same fundamental phenomenon.
One of the consequences of this reciprocity between the two gender gaps is that boys always outperform girls when controlling for their level of proficiencies in reading. Figure 4 demonstrates this advantage of boys in few selected PISA countries. Rapp (2015) stated that this occurs at every level of reading and in any participating country, even in countries where girls on average do as well as, or even better than boys in maths (e.g. Finland or Jordan). This consistency stands in contrast to the variability of the magnitude of the gender gap in maths mentioned above, used by many to support the environmental explanation of the gender gap in maths.

[8] Right-facing columns represent advantage in favour of girls; left-facing columns – in favour of boys.

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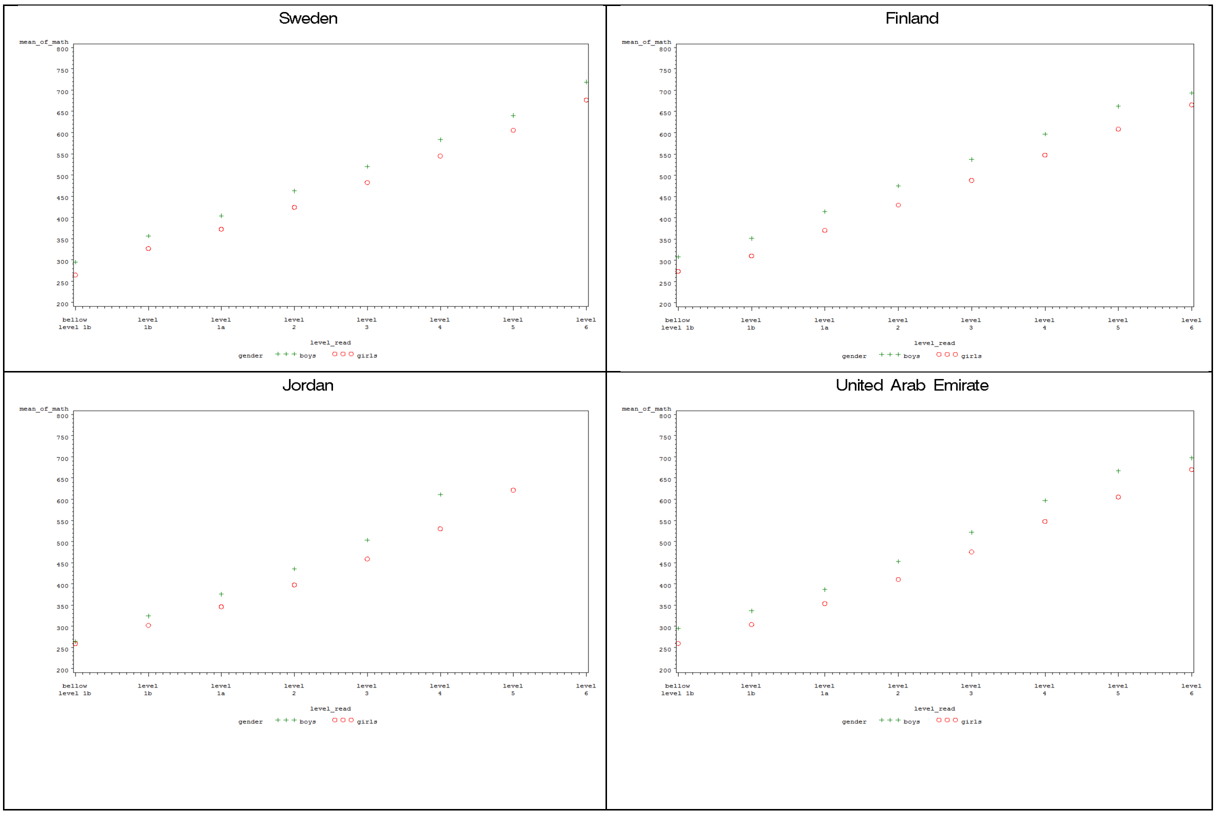
Figure 4. Mean maths scores of boys (cross) and girls (circles) as a function of reading proficiency level in PISA 2012 in selected countries.



Source: Rapp, 2015

1.5. THE CURRENT STUDY

In the current study, a comparative approach was used to explore the gaps in maths and reading. This approach represents a shift from a between gender perspective, used previously by scholars, to a within gender group perspective. By definition, a comparative approach treats both gaps simultaneously and symmetrically. Comparing the achievements in reading and maths domain within each gender group, Guiso et al. (2008) indicated explicitly that boys tend to be better in maths than in reading, and girls tend to be better in reading than in maths. This occurrence was later stressed by other scholars (e.g. Stoet & Geary, 2015; Breda & Napp, 2019).

As might be expected, this reversed occurrence between the two gender groups is valid also for individuals. That is, a boy is more likely to be better in maths than in reading and a girl is more likely to be better in reading than in maths (see also Breda and Napp, 2019 who have recently expressed a similar idea). With this in mind, in the current research we focused on the difference between the performance in maths and reading at the level of student. We searched for factors (other than gender) that could be related to this intra-personal difference. Identifying such factors is important since it can overcome the shortcoming of previous research mentioned above. That is, research emphasizing socio-cultural factors that subsequently were identified as having effect on girls' performance in both maths and reading in the same direction.

Personal characteristics, as motivational and emotional aspects, have the potential to relate to the performance of girls in maths (or the achievement of boys in reading) exclusively. They can narrow the gap in one domain without at the same time enlarging the gap in the other domain. Another advantage of adopting a within-person perspective is that it enlarges the scope of explanations of gender gaps by conceptualizing the topic in terms of psychological models ((Marsh, 1986, 1989, 2007; Möller & Marsh, 2013) [9].

In the search for potential factors that may influence gender gaps, we also emphasized potential characteristics of the setting in which girls and boys are educated (see Fox et al., 2011). Thus far, most of the gender gap research has extensively focused on possible explanatory (social and cultural) factors at the level of countries. Yet, within countries there can be different policies applied in different schools, such as pattern of inclusion or teaching practices, that could influence gender gaps at school. Thus, focusing on between countries may obscure the influence of institutional factors characterizing the school which is the direct environment where most of the learning takes place (Cahan et al., 2014). In the current exploration, we therefore have also searched for schools' characteristics related to the inner difference in question.

In view of all of the above, in the current study we addressed the following questions:

1. How dominant is gender in determining students' relative performance in maths compared to reading?
2. What other student characteristics affect students' relative performance in maths versus reading and might mitigate the effect of gender?
3. What school policies or characteristics affect students' difference between maths and reading?
4. What set of factors, personal or institutional, is more important in determining this difference?
5. Is there a consistent pattern across countries?

2. METHOD

In the current work, data from PISA 2012 was used. PISA is an international, large scale assessment study conducted by the Organization for Economic Co-operation and Development (OECD) in 65 countries[10]. The PISA data was well suited for our inquiry, as it measures achievement in maths, reading, and scientific literacy of the same students and thus allows applying a within-subject methodology. PISA measures 15-year old students' achievement, alongside a considerable number of demographic and socioeconomic variables and motivational and emotional aspects including student attitude towards school and studies. Moreover, data from each school participating in PISA covering school management, resources, student-teacher relationships, class atmosphere, selection policy, assessment and more are collected from school principals and linked to the students' data.

The first PISA cycle was conducted in 2000, and has been administered every three years since. In each cycle one of the three literacy domains is chosen to be covered in greater depth. PISA 2012 was the last cycle in which mathematic literacy was the major subject. This allows us to get more in-depth information on students that was related to their maths' studies such as their personal attitude toward maths and contextual information about their school and mathematics learning experiences.

2.1. PARTICIPANTS

In 2012, more than half a million students from 65 countries and economies (of which 34 OECD countries) participated in PISA. We used the student and the school data sets of PISA 2012 which

[9] Specifically, we borrowed ideas from Marsh dimensional comparison theory presented briefly in the discussion chapter. This theory sees the personal difference between the level of achievement in a certain domain and another domain as crucial in defining the person self- concept in those domains. Using psychological factors is in line with a number of works exploring psychological and motivational dissimilarities between boys and girls related to maths achievement such as self-concept in maths and math anxiety (e.g. Gallagher & Kaufman, 2005; Goldman & Penner, 2014; Preckel et al., 2008, Breda & Napp, 2019).

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consisted of a representative sample of about 150 schools and 5000 students in each participating country, representing the full 15 years old cohort of students in a country[11]. [12].
In the study only observations of students studying in the normative grade for 15 year olds in a given country (usually tenth grade) were included[13]. In addition, since we were interested in comparing boys and girls within each school, we only included data from schools with a balanced proportion of boys and girls (between 35% and 65%), in which there were at least 13 boys and 13 girls in the actual sample [14]. This is important because achievement levels of boys or girls are sometimes related to the proportion of boys and girls in a school.

2.2. MEASURES

PISA achievement levels in maths, reading, and science literacy are estimated using an IRT Rasch model. In each of the three domains, there are five plausible values for each student (see OECD, 2014 for further details). Scores in PISA are scaled such that the ability distribution in each domain has been set to have 500 points as a mean and 100 points as a standard deviation (SD) in the OECD countries in the first cycle of the survey.
For our purpose, a within individual difference between the PISA students' score in maths and reading was used as dependent variable (hereafter "DIFmathread")[15]. Although according to pure psychometric practices, calculating the difference between scores that do not measure the same construct might be misleading, in the current context, we presume it has a valuable meaning in psychological terms. Due to the scaling process, the scores in each literacy domain can be interpreted as standardized scores. That is, if a student gets a 700 score in reading and a 450 score in maths, she is two standard deviations (SD) above the average score in reading and half a SD below the average score in maths. Hence, she is in a higher position of competency in reading than in maths. In the context of dimensional comparison theory and since reading and maths performances have similar metrics at school and self-comparisons of scores in various domains are done regularly by students, we presume the methodology is proper for the current purpose[16].
The measures that we used as independent variables are in most cases indices constructed by PISA, based on questions administered either in the student or the school questionnaires[17] [18]. In a few cases we used the raw response to a question or the level of agreement with a statement[19]. We focused on aspects that are likely to affect differentially achievement in reading and in maths or on issues that could potentially affect differentially boys and girls. For example, the SCMAT index measures maths self-concept and is calculated according to students' responses to several statements regarding their belief in their own ability in maths (e.g. I am just not skilled in mathematics, I learn mathematics quickly, etc.) Indices not specific to maths or reading were not

[11] More specifically, we used observations collected in 63 countries, of which 33 OECD countries, from the data base.
[12] According to a two stage sample design, about 150 schools in each country were selected and in each selected school around 35-40 15 years old students were sampled. In general, about 5000 students participated from each country, with some countries executing a much larger sample.
[13] We were aware that there are differences in PISA achievement between 15 years old students who are studying in different grades, some having had nine years of education and others ten. Moreover, the proportion of 15 years old boys studying in 9th grade is usually higher than that of girls. From this reason we focused only on students of the most prominent grade in each country.
[14] That is, single-sex schools or schools that have a large majority of boys or girls were excluded. Proportion of boys and girls was declared by the school's principal in the school questionnaire, If no information on this proportion was given by the school principal, we included the school only if the proportion of boys (or girls) in the school sample in practice was between 35% and 65%.
[15] More precisely, we use the difference between the third plausible value in mathematics literacy and the third plausible value in reading literacy.
[16] Similar measures of intra-individual differences have been previously used in the literature. Park et al. (2007) used SAT-Q – SAT-L to show how the intra-personal difference between achievement in math and reading influences students' later selection of career. Guiso et. al. (2008) used the difference between boys' mathematics and boys' reading scores in PISA 2003 at the level of countries to analyse its correlation with indices of gender equality. Similarly, Stoet and Geary (2015) calculated an intra-personal measure of PISA by subtracting the mathematics and reading scores of each student to compare between the average of this measure in the two gender groups. Recently, Breda and Napp (2019) have used the same data and a similar measure of difference between maths and reading ability at the individual level (which they called MR) in order to show how the student comparative advantage of maths over reading is related to intentions to pursue maths-related studies and some math related attitude .
[17] The indices assembled by PISA are based on data collected in the PISA student and school questionnaires and standardized to have a mean of zero and a standard deviation in OECD countries. See Box III.2.1 in Volume 3 chapter 2 of the PISA 2012 report (OECD 2014) for a detailed description of how PISA indices were constructed.
[18] The student questionnaire is answered by the students while the school questionnaire is answered by the school principals.
[19] In each statement, students or principals have to indicate whether they strongly agree, agree, disagree or strongly disagree with the statement.

included in the current work (e.g. students' reports on whether they tend to arrive late for school, absenteeism, sense of belonging etc).

Table 1 in Appendix 1 displays the full list of variables and indices explored in the current study, their interpretation and the models in which they were included. More information about the indices can be found in the PISA 2012 report (OECD, 2014). For our purpose, the relevant indices were divided into three sets. The first set was composed of 11 indices (except for gender and ESCS[20]) based on student's self-report and representing students' emotional and motivational attributes, such as whether they are anxious about maths, their level of engagement at school etc. The second set was also composed of indices based on students' reports, but this time the indices represented the students' views on issues related to their school such as student-teacher relationships or the disciplinary climate at school. These indices were created by averaging students' responses in a given school. There were 8 indices in this set (except for the school average ESCS[21]). The third set was composed of indices and representing the schools as reported by the school principals (e.g. is it a private or a public school?, is there shortage of maths teachers?, etc.). There were 22 indices in this set. Some of them were school indicators used in the PISA study and some were specially created by us based on the responses to several statements.

2.3. THE REGRESSION MODELS

According to this classification we tested four regression models. At each step in the analysis we added a set of explanatory variables. First a basic model was tested in order to uncover how much of the variance in the dependent variable is explained solely by gender. The following models added the sets of indices in the above order. If when other factors are considered in the model, the relationship between gender and DIFmathread changes, this would imply that the relationship between gender and the dependent variable is, at least in part, interfered with (or determined by) other factors that are correlated with gender.

3. RESULTS

3.1. BASIC MODEL

The estimated coefficients of the basic regression model that includes only gender as the independent variable are presented in Table 2 by country (in Appendix 1). The table informs that gender tend to be very important in explaining the difference between maths and reading achievement (DIFmathread) at the student level. In all countries gender is associated quite highly with it and explained about 20% of its variance (22% in OECD countries), ranging from 9% (in Singapore), or 14% (in Australia – the minimum among OECD's countries), to maximum 37% (in Germany). In accordance with this, the estimates of gender coefficient were relatively large, varying between 28-66 score points across all countries (and between 35-60 in OECD countries). The average of this coefficient across all countries (as well as OECD countries) was about 47 score points. This extent of the coefficient expresses the meaningful difference between the genders with respect to the inner-difference between maths and reading scores.

3.2. MODEL 2

The first set of variables to add to the model was the set of students' variables. The estimates of the coefficients of those variables and of gender are presented in Table 3 (Appendix 1). In most countries, when students' personal factors were considered in the model, their associations with DIFmathread were significant albeit relatively weak.

[20] ESCS is the PISA index of economic, social and cultural status based on students' responses in the student questionnaire to items such as their home possessions, parent occupation and the level of parental education.

[21] The average ESCS represents the general socio-economic-cultural level of the 15 y' old students studying at a given school.

The explained variance of DIFmathread increased on average, from about 20% in the basic model to about one third (35%) in this model. Extraordinarily, in Korea, Poland, Slovenia and Germany, student factors explained about half of the variance of DIFmathread, with about 20-30 percent more explained variance than in the basic model.

The student characteristic, aside from gender, that had the highest relationship was the student's self-confidence in maths (SCMAT). The variable had a coefficient of about 12-13 score points on average and it was statistically significant in all countries but three. The positive correlation of SCMAT and the difference between maths and reading means that the self-concept in maths is to be influenced by how strong ones' maths skills are in comparison to reading and not just by maths level per-se. Three other indices that have a somewhat remarkable influence on DIFmathread were MATHEFF, MATINTFC and cont_gen[22]. On average across OECD countries, their coefficients were about 6, 4.5 and 12-13 score points concordantly[23][24].

MATWKETH[25] and ANXMAT were both found to be associated slightly negatively in some countries with DIFmathread. This indicates that the more maths anxiety a student has and the more he applies habits of learning in maths, the more he would be expected to do relatively worse in maths than in language. 0n the other hand, MATBEH[26] variable, had a slight positive influence on DIFmathread. This makes sense since students who participate in such activity tend to be relatively more successful in maths to begin with.

The other indices FAILMAT, INTMAT and INSTMOT[27] were in almost all countries not associated with DIFmathread. Only in very few countries the coefficients were significant and generally there was not a consistent direction to the coefficients across countries.

Despite the fact that in many countries, the socio-economic-cultural status (ESCS) has a central effect on the level of achievement at school, the variable was not found to have an important influence on DIFmathread: The coefficient was on average around minus one and there was no fixed direction across countries. This indicates that its influence must be very similar in reading and in maths[28].

Table 4 (Appendix 1) presents the average of the gender coefficients in the two first models and the percentage of the variance explained by the two models (expressed in terms of r^2). The table indicates that adding personal variables to the basic model not only increased the explained variance of DIFmathread but also reduced the coefficient of gender to some extent. The decrease was on average about 8 score points. For 21 of the OECD countries the coefficient decreased by 5 to 10 score points. In some the decrease was more than 12 score points (Australia, Switzerland and Finland) while on the other end, there was less than a two points decrease (in Turkey, where the gender coefficient was relatively high - 51 score points on the first model). In any case, gender was

[22] MATHEFF index measures the perceived confidence students have in applying maths in everyday life or in solving maths exercises, MATINTFC measures whether a student prefers to learn maths over language (reading) and cont_gen is an index of the perceived control of success at school in general. More specifically it measures whether the student tends to externalize or internalize locus of control regarding her success at school (see Table 1).

[23]Here one has to be cautious as the metrics of cont_gen and cont_mat (index of perceived control over success at school in math) are different from the other indices. Linearly changing the metrics to be similar to the other indices (having a mean of 0 and SD of 1) would result in coefficients of approximately 4 points (for cont_gen), on average. Interestingly, cont_gen, was related to the dependent variable despite its potential relation to students' success both in reading and in maths (since it represents a general attitude to school). It is important to note, however, that the influence on DIFmathread of the similar index - cont_mat - based on similar statements in the PISA student questionnaire but focusing on maths solely, was less than half of the index of cont_gen (about 5 vs. 13). In addition, cont_mat was significant in only 20 countries compared to 44 countries for cont_gen. These results suggest hence that DIFmathread is related to maths and reading in a different manner.

[24] In all cases of correlations between a given variable and the dependent variable, it is difficult to determine the direction of the causality. For example, if a student is more successful at school in maths than in reading, obviously he might like maths more than reading. On the other hand, if he likes maths more than verbal-based subjects, he might be more motivated to learn maths and thus achieve higher in maths than in reading.

[25] MATWKETH is the index measuring the habits of learning math; ANXMAT is the level of mathematics anxiety.

[26] MATBEH is students' reports on participation in activities related to maths,

[27] FAILMAT: index of locus of control in math; INTMAT: Index of intrinsic motivation to learn mathematics; and INSTMOT: mathematics instrumental motivation.

[28]A separate test, not presented here, has factors. The shown that it does not have an influence on the coefficient of gender found in the basic model. In addition, in order to check for any interaction effects between student characteristics and their gender on DIFmathread, we repeated the same procedure and model, adding the interactive terms of gender with each of the other personal results of this stageshowed that the interactive elements had an insignificant contribution to the prediction of DIFmathread. In total, all the interactive elements added only about one percent to the explained variability.

still the most important personal explanatory variable of DIFmathread, its coefficient ranging for most OECD countries between 25 to 50 score points in the current model, and between 35-60 in the former model.

3.3. MODEL 3

The second set of explanatory variables added to the equation was composed of school factors that were computed by averaging students' responses to various questionnaire items in a given school[29]. We also included the school socioeconomic status average. If these variables would have a different influence on the maths (or reading) achievement level of boys and girls, then their coefficient estimators would be expected to have a noticeable value. The estimated coefficients are presented in Table 5 (a and b) in Appendix 1. Table 6 presents the coefficients of gender in the first three models and the differences between them in model 2 and 3. It also presents the percentages of explained variance. The tables show that introducing this set of school variables to the model did not affect the relationship between gender and DIFmathread much. On average across all countries the coefficient of gender in the regression model remained stable (38.68 in average in model2 and 38.42 in model 3), as did the average of OECD countries (39.03 and 38.94 concordantly). Following the addition of this set of school variables to the regression model, the explained variance of DIFmathread grew by only 2 percent: from 36 to 38 percent on average for all countries and from 38 to 40 percent on average for OECD countries.

The data in tables 5a and 5b validate this finding since the regression coefficients of the current set of school factors tend to be insignificant. Moreover, adding the set of school characteristics generally did not much change the coefficients of personal characteristics calculated in the previous step. The correlation across countries between the coefficients of a given variable in model 3 and 2 was fairly high (usually above .97). The only exception was the coefficient of the ESCS variable[30].

3.4. MODEL 4

The last step in the analysis was to add the second set of explanatory school variables to the equation[31]. The estimated coefficients of all the variables are presented in tables 7a-d in Appendix 1. Table 8 (Appendix 1) presents the gender coefficient in the four models and the difference between them in models 3 and 4 alongside the amount of the explained variance. As in model 3, in general, adding the set of school factors taken from the school questionnaires to the regression model did not affect the gender coefficient very much or the coefficients of the other personal variables (see table 7 compared to table 5 or table 3)[32].

All the coefficients of school variables (added in model 3 or in the current model) were rather varying largely across countries and not significant, with coefficients ranging from very negative to very positive values and on average close to zero. Nevertheless, the new set of school characteristics added about 4 percent to the explained variability of the dependent variable in model 3. In New Zealand, Czechoslovakia and Canada the increase ranged above 7 percent. In total (model 3 and 4 together) school characteristics explained on average 6% more of the variance than what was explained by personal features only (model 2).

[29] Accordingly, students in the same school would get the same values in these indices.

[30] The correlation between its estimated coefficients in model 2 and 3 is only about .64, and there were only 2 countries for which the coefficient was significant in model 3, compared to 18 countries. This could be due to the inclusion of the school socioeconomic status average (escs.M) in the model. Generally, the escs.M variable did not play an important role in predicting DiFmathread. However the regression coefficient of escs.M tended to be negative in many countries (the average coefficient of escs.M across OECD countries was -0.5) indicating that the relative achievement in maths, compared to reading, tends to be somewhat lower in schools attended by lower socio-cultural-economic status students.

[31] In this model again, students from the same schools get the same values of indices and factors.

[32] Again, usually, there was a high correlation between the estimates of these coefficients in model 2, 3 and 4. With some exceptions, the correlations between the estimated coefficients of a given school variable in model 3 and 4 were quite high (usually around 0.8).

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Overall, using all the independent variables (added in model 2, 3 or 4), we were able to explain as much as twice the variance in the dependent variable as that explained by gender solely: 42% vs. 20% on average across all countries and 44% vs. 22% in OECD countries[33].

Reviewing all the regression process reveals some important patterns. On one hand, adding the personal characteristics to the regression somewhat improved our ability to predict DIFmathread - It increased the explained variability from about one fifth in the basic model to more than one third, on average across countries. These characteristics also mitigated to some extent the explanatory role of gender in predicting the difference between maths and reading scores. On the other hand, the dozens of potential explanatory institutional variables had only a poor impact on it. It is important to note that this relatively low contribution of school characteristics does not suggest that school factors do not effect students' achievements in maths and reading but rather that they may have a similar influence on the academic achievements in both.

4. DISCUSSION AND CONCLUSIONS

In the current study we have adopted a comprehensive approach for analyzing and interpreting the issue of gender gaps in achievement at school. Since achievement in maths is highly correlated with reading proficiency, we have focused on the performance in maths compare to reading at the level of students, rather than just their performance in maths per se. In this way, we have tried to extract what can explain maths or reading achievements and what may "work" for narrowing the maths or the reading gender gap exclusively. As scholars have shown in previous research (e.g. Park et al., 2007; Wang et al., 2013; Stoet & Geary, 2015), student' s difference between the performance level in maths and reading is an important factor influencing later educational choices and the chances to enter into STEM fields in the labour market (Breda & Napp, 2019).

4.1. GENDER IS THE MOST DOMINANT VARIABLE DETERMINING A STUDENT'S RELATIVE STRENGTH IN MATHS VS READING

In brief, testing dozens of factors, either personal or school characteristics, we were quite successful in explaining the variability of intra-individual differences between maths and reading achievement. However, our results indicate undoubtedly that students' gender is the key variable that explains best the intra-personal difference between maths and reading achievement. It explains about one fifth of the dependent variable variance which is about half of the overall variance explained by all variables tested in the current work. In other words, our study has shown that boys and girls as individuals differ in their relative performance in maths and reading. Boys are likely to be better in maths than in reading while the contrary is true for girls. A boy, on average, has an advantage in maths over reading which is almost 50 score points larger (half a standard deviation of PISA scores) than what is expected for a girl. This finding was consistent in all countries participating in PISA 2012, regardless of the country average level of achievement in maths or reading, and of the magnitude and direction of the gender gaps in these two domains.

The prominence of the gender factor was underscored by the fact that when we added to the regression model a series of mediating factors based on students' characteristics or self-perceptions of their capabilities in maths, the contribution of the gender variable as an explanatory variable declined only slightly. Furthermore, adding the series of school factors to the regression did not affect the gender influence at all.

[33] More specifically, the variables in this model explained between 25%-60% of the variability of DIFmathread in the different countries. In addition, in most countries gender alone accounted for 1/3 to 2/3 of the total explained variance (in model 4). Only in four countries (China-Shangai, Singapore, Tapei and Malaysia), gender alone accounted for less than 30% of the total explained variance of DIFmathread.

4.2. PERSONAL CHARACTERISTICS COUNT

Aside from gender, the other personal variables we used in the study contributed another sixth to the explained variance of the dependent variable, which was about one third of the total explained variance. The list of personal variables that correlated with the inner difference in performance in maths and reading included primarily students' self-concept in maths, next, student self-efficacy in maths and then to a minor extent, some other personal, motivational and emotional characteristics.

4.3. SCHOOL CHARACTERISTICS DO NOT PLAY AN IMPORTANT ROLE IN DETERMINING THE INTRA-PERSONAL GAP

Unlike personal attributes school characteristics did not appear to explain much of the variance in the intra-individual difference between maths and reading. Adding dozens of school characteristics contributed as little as 6% of the explained variance (less than 15% of the total explained variance) Correspondingly, these school factors had no contribution in moderating boys' advantage in maths over reading or girls' in reading over maths. Thus, we could not extract any particular school characteristics or policies or educational practices applied at schools that would reduce the dominancy of gender on the relative performance of students in maths vs. reading. Regarding our second and third research questions, it seems that in the current reality, being better in maths or in reading tends to be determined more by personal tendencies than by school characteristics or policies. This conclusion is of course limited to the sort of data collected in PISA and it can be argued that there may be other school indicators or policies, or even specific educational interventions, not measured in PISA, that might have impact on the difference between maths and reading achievement of boys or girls. However, in the context of the current study, since we have tested dozens of school characteristics and received similar results in most of the countries, it seems that we can reach this conclusion with some confidence.

4.4. IMPLICATIONS FOR THE RESEARCH OF GENDER GAP IN MATHS

The findings of the current study have some important implications for the research field of gender gap in maths. The invariance across countries regarding the relatively large influence of gender in the current study stands in contrast to the variability across countries and over time of the gender gap in maths. This is important to note because this variability has been used in the last decades as a central argument to support socio-cultural (environmental) explanations and to debunk biologically based explanations of the maths gender gap (Else-Quest et al., 2010; Guiso et al., 2008; Nosek et.al., 2009; Valla & Ceci, 2011). Our results cast doubts upon the over-attention the variability of gender gap had been given in the literature as an argument supporting the socio-cultural approach of the gender gap in maths. But does this imply that the origins of boys' relative strength in maths are biological rather than social? Not necessarily. A careful inspection of our results shows that there are still some differences across countries and that in some countries gender is less dominant in determining the inner difference between math and reading. It could be interesting to explore those countries education system (e.g. Malaysia, the Russian federation and Kazakhstan).

Another important aspect of the current work is that it underscores how important it is to explore the gender gaps in ways that would extract what is unique to maths (or reading). As was explained in the introduction, ignoring the co-relation between maths achievement and general academic achievement at school can be misleading and leads to conclusions that are maybe true but only partially valid. Firstly, it is less accurate to discuss girls' improvement in maths if this improvement is not specific to it but it is part of a broader change. Therefore, it is critical to distinguish between identifying variables that enhance girls' achievement in maths exclusively and those that enhance their achievement in maths as part of their achievements at school in general. Apparently, Guiso et.al (2008) were already aware of this distinction. Their study mainly brought to light the relationship between the gender gap in maths and the extent of gender equality across countries, but they also presented graphs showing that the same influence was just as valid for the gender gap in reading. Therefore, they claimed that the difference between boys' math and reading scores is not correlated with any of the measures of gender equality they used. Unfortunately, the researchers who followed Guiso et. al.'s publication referred to the first argument and mostly ignored the second. As a result they continued to search for factors influencing the gap in maths without taking in account the larger context of the topic.

In the context of enhancing gender equality, it is less effective to identify factors (e.g. more equality in society) related to improving girls' outcome in maths (and this way narrowing the gender gap disfavoring them) if the same factors contribute at the same time to improve girls' outcome in reading and thus enlarge the gender gap in reading disfavoring boys. The very same socio-cultural factors and educational interventions may reduce one problem but enlarge another.

4.5. THE INTRA-INDIVIDUAL DIFFERENCE AND THE UNDER REPRESENTATION OF WOMEN IN STEM

We think the distinction mentioned above between improving specifically in maths versus improving in maths as part of a general academic improvement is also important from the psychological point of view. In this work we have used an intra-person approach which allows us to use psychological models. Specifically, we were inspired by the dimensional comparison theory (Marsh, 1986, 1989, 2007; Marsh et al., 2015; Möller & Marsh, 2013). The gist of the theory is that people compare their performance across different domains to reach conclusions about their own abilities. The central term of the theory is self-concept. The concept of abilities of the self is shaped by external comparisons (i.e. social – comparing self to others) as well as internal comparisons across dimensions (comparing self in one dimension to other dimensions) or across time (comparing self to previous experiences). In the process of developing a self-concept of abilities, a student compares his ability in a given domain to his ability in other domains (e.g. "How good am I in maths compared to reading?"). Dimensional comparisons reduce self-concept in the worst domain and improve self-concept in the better domain (e.g. Parker et al., 2015). Due to this intra-personal model, students performing better in reading than in maths tend to have a lower perception of their maths ability than students who have an identical mathematical competence but lower ability in reading. Furthermore, it has been revealed that even bright students who score higher than their classmates in all school domains have an average or below-average self-concept in their weakest school subject (Mui et al., 2000; Plucker and Stocking, 2001). In a similar way, students may have an average or above average self- concept in their best school subject regardless of their absolute scores.

Since girls tend to do better in reading than in maths they will most likely develop a lower self-concept in maths than in reading and vice versa for boys. On the other hand, a growing body of research indicates that academic self-concept, including and especially maths self-concept, is an important predictor of educational choices made in school and beyond (Eccles et al., 2004; Nagy et al., 2006; Parker et al., 2014; Parker et al., 2012). This phenomenon can be used to explain why men tend to later select a STEM career (Goldman & Penner, 2014) and women tend to retreat from it. Ceci et al. (2009), Park et al. (2007) and Wang et al. (2013) showed that even high achieving girls in maths have a higher likelihood to choose a non-STEM career for the simple reason that they are usually also excellent in language and therefore, they have more freedom to choose between a maths-related career or a language-related one. On the other hand, many boys have almost no choice but to choose a math-related career since maths is in many cases, the domain in which they are best. In a competitive environment, this sort of decisions are quite effective. Breda and Napp (2019) showed how students' comparative advantage in math with respect to reading impacts educational choices, which in turn, they explain, might be one of the sources of women's under-representation in STEM fields (see also Fox et.al. 2011; Goldman & Penner, 2014; Valian, 2007). Our results were generally in line with this explanation and support it. We have pointed to the relatively high importance of self-concept over other personal and school characteristics in explaining the intra-individual difference between maths and reading. However, we recognize that this is an exploratory research based on PISA data, and that this data was not intentionally collected for this purpose. We are aware that more research in this direction, is needed in order to establish the suggested psycho-social model and to tie its different parts together.

4.6. SELF CONCEPT SHAPES STEREOTYPES

The different self-concepts of boys and girls in maths and reading can also elucidate the unexplained prevalence of the stereotype of boys as being better in mathematic. This stereotype persists in spite of recent accumulated evidences that the gender gap in maths is narrowing or even completely vanishing (Else-Quest, et.al., 2010). We presume that the relative performance in maths with respect to reading (and other school domains) not only can shape the way students perceive themselves but also the way they are perceived by others - friends, teachers or parents. Simply, we suggest that students (and others) tend to evaluate themselves (and to be evaluated by others) in term of what they are better at, and not necessarily in terms of their objective level of performance in a given domain. This misconception might be a result of mixing up within-groups and between-groups comparisons. According to within-groups comparisons, since maths is the best school domain of boys. they can easily be perceived and perceive themselves (although sometimes incorrectly) as better than girls in this domain.

4.7. OUTLOOK

Promoting gender equity in society and in the labour market is a common goal to many countries and education systems. Educators and policy makers will agree that equity starts with gender equality at school and with closing the gender gaps that exists in various school subjects. However up until now, much of the educational literature seems to be primarily concerned with closing the gender gap in maths at school, which is viewed as the main obstacle for girls to later pursue careers in STEM domains. The current study has shaded light on the imbalance characterizing the research of gender gaps at school. We presume that emphasizing only one gender gap and on one gender group was non effective and even detrimental.

In order to trigger a change in schools and to progress toward a more equitable society, scholars, educators and policy makers need first to recognize that the source of the gender discrepancy lay in the inner difference between maths and reading at the personal level, which is a result of the advantage of boys in maths on one hand and the advantage of girls in reading on the other hand. They also have to be aware that this discrepancy shapes how boys and girls perceived themselves (and are perceived by others) which in turn influences males and females future choices and routes. Finally, they need to look for educational interventions that would potentially reduce the gender imbalance, i.e. narrowing one gap without enlarging at the same time the other. This can be achieved for example by encouraging girls to improve their maths skills but at the same time promoting the improvement of boys language skills. As much as boys will succeed in reading or in any other verbally loaded school subjects such as humanities, social sciences or literature, there would have higher confidence in those subjects and higher chances to prefer these subjects later in life. A mirror process with respect to maths and related sciences is required for girls. Societal and educational change with respect to gender might be a long and challenging process, but in order to succeed it has to be bi-directional.

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APPENDIX 1

Table 1: Variables included in the model for the analysis of the intra-personal difference between performance in maths and in reading.

Name of variable in the current study	Name of variable in the PISA data base[34]	Definition	Range of values	Remarks (interpretation)
	Dependent Variable			
	DIFmathread	pv3math – pv3read	-1000 to +1000	The difference between a student's score (plausible value 3) in mathematics literacy and his score (plausible value 3) in reading literacy. A variable especially calculated for the current study representing intra-individual differences. Since PV3math and PV3read can theoretically range between 0 and 1000, the difference between them hence can range between -1000 and +1000.
	Independent Variables:			
	Students variables included in model 2, 3 and 4:			
	Gender	Gender of student as reported by student	1= Female 2=Male	
	ESCS	Index of socio-economic-cultural background	The PISA scale (mean=0, SD=1)	Calculated by PISA according to background items in the student questionnaire
	cont_mat	Index of perceived control of success in maths based on items st43q01 to st43q06 in the student questionnaire	Items 01, 02, 05 were reversely recoded as (4=0), (3=1), (2=2), (1=3). Items 03, 04, 06 were coded as (1=0), (2=1), (3=2), (4=3). Index score was calculated as a ratio of a sum of all questions over maximum score of valid responses (questions with missing value did not contribute to max score).	How much a student believes that her success in maths depends on her efforts or on external reasons
	cont_gen	Index of perceived control of success in general based on st91q01 to st91q06 in the student questionnaire	Items 01, 02 and 05 were reversely recoded as (4=0), (3=1), (2=2), (1=3). Items 03, 04 and 06 were coded as (4=3), (3=2), (2=1), (1=0). Index score was calculated as a ratio of a sum of all questions over maximum score of valid	How much a student believes that his success at school depends on his efforts or on external reasons (same statements as in maths but regarding general success at school).

[34] In cases where the name of the variable is of the form st##, st##q##, sc## or sc##q##, they refer to the original name of items or statement in the PISA student questionnaire (st##, st##q##), or in the PISA school questionnaire (sc## or st##q##).

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			responses (questions with missing values did not contribute to max score).	
	SCMAT	Index of self-concept	The PISA scale (mean=0, SD=1)	Student's perceived competence in maths
	INTMAT	Index of intrinsic motivation to learn mathematics	The PISA scale (mean=0, SD=1)	Students perceived enjoyment and interest in maths
	INSTMOT	Index of instrumental motivation to learn mathematics	The PISA scale (mean=0, SD=1)	Students perceived importance of maths to their own life
	MATHEFF	Index of mathematics self-efficacy	The PISA scale (mean=0, SD=1)	Student's perceived ability to solve applied and pure maths tasks
	ANXMAT	Index of mathematics anxiety	The PISA scale (mean=0, SD=1)	Student's feeling of stress and helplessness when dealing with maths
	FAILMAT	Index of locus of control	The PISA scale (mean=0, SD=1)	Student's perceived self-responsibility for failing in maths
	MATWKETH	Index of mathematics work habits	The PISA scale (mean=0, SD=1)	Student's report on habits in learning maths
	MATINTFC	Index of mathematics intentions (forced choice items)	The PISA scale (mean=0, SD=1)	Students report about intention to choose a maths related rather than language related career and activities
	MATBEH	Index of mathematics behavior	The PISA scale (mean=0, SD=1)?	Students reports on participation in activities related to maths
	School variables (based on averaging students responses to items in the student questionnaire by school) included in Model 3 and 4:			
	STUDREL.M	School average of STUDREL (Index of student-teacher relationship)	The PISA scale (mean=0, SD=1)	Students report about quality of the teacher-student relationship
	COGACT.M	School average of COGACT (Index of teacher's use of cognitive activation strategy in mathematic classes)	The PISA scale (mean=0, SD=1)	Student s reporting about their maths teachers pedagogical habits
	TCHBEHTD.M	School average of TCHBEHTD (Index of teacher-directed instruction in mathematics lessons) St79	The PISA scale (mean=0, SD=1)	Students reporting about their maths teachers' pedagogical habits in mathematic lessons (set clear goals, ask students to present thinking , ask to check if student understood)
	TCHBEHSO.M	School average of TCHBEHSO (Index of teachers' student	The PISA scale (mean=0, SD=1)	Students reporting on teachers' differential teaching in mathematic lessons

		orientation instruction in mathematics lessons) St79		
	TCHBEHFA.M	School average of TCHBEHFA (Index of teacher's use of formative assessment in mathematics lessons) Item st79	The PISA scale (mean=0, SD=1)	Students report how often teachers give feedback and tell students what they need to improve in mathematic lessons
	DISCLM.M	School average of DISCLM (Index of disciplinary climate in mathematic lessons) Item st81	The PISA scale (mean=0, SD=1)	Students report on how often incidents of problematic discipline happen in mathematic class
	MTSUP.M	School average of MTSUP (Index of mathematics teacher support) item st83	The PISA scale (mean=0, SD=1)	Students report on the level of the support given by maths teacher
	CLSMAN.M	School average of CLSMAN (Index of mathematics teacher control in class) Item st85	The PISA scale (mean=0, SD=1)	Students report on the level of maths teacher control in class
	ESCS.M	Average of ESCS at this school	The PISA scale (mean=0, SD=1)	ESCS is the Socio-economic-cultural student index calculated by PISA according to background items in the student questionnaire
Name of variable in the current study	School variables based on principal responses to single or multiple items or statements in school questionnaire included in model 4			
SCH1	sc03q01	School, location (a village, a town, a city, etc.)	from 1 (small village) to 5 (large city)	As reported by the school principal
SCH2 SCH3 SCH4	sc14q02 sc14q03 sc14q10	lack of mathematics teachers lack of language teachers lack of library material	from 1 (not at all) to 4 (a lot)	Statements representing factors that may hinder instruction at school as perceived and reported by the school principal
SCH5 SCH6	sc15q01 sc15q02	Mathematics classes study similar content, but at different levels of difficulty. Different classes study different content or sets of	from 1 (for all classes) to 3 (not any classes	Statements representing the issue of organization of differential instruction for students with different abilities (ability grouping), as reported by the school principal.

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		mathematics topics that have different level of difficulty		
SCH7 SCH8	sc16q05 sc16q07	mathematics club Chess club	1-yes , 2-no	Statements representing the issue of extracurricular activities at school – as reported by the school principal
SCH9 SCH10 SCH11 SCH12 SCH13 SCH14 SCH15 SCH16	sc22q05 sc22q06 sc22q09 sc22q10 sc22q13 sc22q14 sc22q17 sc22q19	Student lacking respect for teachers Disruption of classes by students Students not being encouraged Poor students-teachers relations Teachers low expectations Teachers not meeting student's need Teachers too strict Teachers not being well prepared	In each item responses could range between 1 (not at all) to 4 (a lot)	Statements representing the issue of student and teacher behaviour that may hinder learning, as perceived and reported by the principal
SCH17	sc29q01	Importance of emotional development	from 1 (strongly agree) to 4 (strongly disagree)	School principal's report of how much importance teachers in his school attribute to students' emotional development in maths class
SCH18	sc35q02		from 0 to 100%	School principal's report of the percentage of maths teachers at school who attended professional development
SCH19	sc21q02	Does your school offer remedial mathematics lesson?	from 0 (no) to 1 (yes)	Principal's report about additional remedial maths lessons offered at school (based on sc20 and sc21q02)
press_stu	press_stu	Index of potential of pressure experienced at school -- on students	From 0.5 to 2.2 From -2.2 to -1	Potential of pressure experienced at school are three indices calculated especially for the purpose of the current study based on various statement items in the school questionnaire. The exact items used and the and way of calculation were as follows: (sc18q02+sc18q03+sc32q01+sc29q02+sc39q03)*(-1) + (sc44q01))/6; (sc04q01+sc18q04+sc18q05+sc18q08+sc19q01+sc19q02+sc24q01

press_sch	press_sch	on schools		+sc39q03+sc39q05)*(-1)/9;
press_tea	press_tea	on teachers	From -2 to -1	(sc18q06+sc30q01+sc30q02+sc30q03+sc30q04)*(-1)/5;

Table 2. The effect of gender on DIFmathread (the within-person difference between maths and reading achievement), by country. (Lines in gray represent OECD countries; in bold, coefficients statistically significant at $p \leq 0.05$)

COUNTRY	GENDER COEFFICIENT	CONSTANT	R^2
ARE	**51.39**	-24.61	0.25
ARG	**51.71**	-32.73	0.20
AUS	**47.19**	-32.36	0.23
BEL	**39.57**	-15.57	0.16
BGR	**66.09**	-32.55	0.25
BRA	**48.44**	-41.32	0.21
CAN	**45.30**	-27.53	0.17
CHE	**48.13**	-1.48	0.25
CHL	**49.36**	-42.23	0.24
COL	**44.13**	-48.09	0.19
CRI	**49.03**	-56.68	0.23
CZE	**49.26**	-18.97	0.22
DEU	**57.70**	-23.93	0.37
DNK	**44.21**	-18.44	0.22
ESP	**44.96**	-27.46	0.18
EST	**48.87**	-19.89	0.27
FIN	**58.94**	-35.50	0.29
FRA	**50.13**	-36.92	0.21
GBR	**36.79**	-23.96	0.18
GRC	**58.58**	-53.02	0.20
HKG	**39.58**	-6.42	0.17
HRV	**56.75**	-42.52	0.32
HUN	**49.50**	-34.77	0.26
IDN	**34.02**	-38.87	0.11
IRL	**48.00**	-45.22	0.28
ISL	**45.36**	-12.89	0.19
ISR	**57.11**	-46.70	0.20
ITA	**56.59**	-33.48	0.25
JOR	**62.16**	-31.59	0.27
JPN	**42.15**	-23.71	0.18
KAZ	**37.45**	19.83	0.11
KOR	**41.37**	-3.20	0.18
LTU	**55.45**	-26.42	0.32
LUX	**55.04**	-25.76	0.24
LVA	**50.45**	-23.54	0.25
MAC	**39.52**	2.31	0.14
MEX	**37.67**	-28.96	0.14
MNE	**62.16**	-43.60	0.30
MYS	**33.27**	4.40	0.10
NLD	**38.11**	-8.65	0.17
NOR	**48.46**	-39.37	0.19
NZL	**47.70**	-35.63	0.19
PER	**39.67**	-34.29	0.15
POL	**46.35**	-22.91	0.20
PRT	**50.13**	-26.09	0.22
QAT	**41.20**	-29.37	0.13

QCN	**29.08**	28.67	0.10
QRS	**44.72**	-21.34	0.14
ROU	**43.69**	-14.26	0.14
RUS	**38.57**	-12.39	0.11
SGP	**27.61**	17.23	0.09
SRB	**55.11**	-24.94	0.25
SVK	**49.37**	-5.35	0.19
SVN	**55.58**	-9.95	0.27
SWE	**48.64**	-29.68	0.19
TAP	**37.98**	15.72	0.13
THA	**43.08**	-33.61	0.16
TUN	**45.77**	-37.39	0.14
TUR	**50.94**	-50.42	0.21
URY	**46.63**	-23.83	0.16
USA	**35.31**	-33.62	0.17
VNM	**40.70**	-15.79	0.15
ALL Average	46.74	-24.22	0.20
OECD Average	47.95	-27.08	0.22

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Table 3. The effects of students' personal characteristics on DIFmathread (the within-person difference between maths and reading achievement), by country. (Lines in gray represent OECD countries; in bold, coefficients statistically significant at $p \leq 0.05$)

COUNTRY	GENDER	SCMAT	INTMAT	INSTMOT	MATHEFF	ANXMAT	FAILMAT	MATWKETH	MATINTFC	MATBEH	CONT_MAT	CONT_GEN	ESCS	R^2
ARE	**46.63**	**13.98**	1.97	-4.08	1.57	-5.59	1.37	-1.40	2.18	3.89	-1.35	**19.99**	-0.97	0.40
ARG	**47.38**	**9.77**	-1.32	2.03	**5.40**	-1.70	-0.06	-1.63	**3.90**	**3.89**	**12.98**	**11.61**	-0.68	0.30
AUS	**32.16**	**11.09**	0.82	0.65	**7.96**	**-3.87**	**-3.11**	-2.00	**6.16**	**2.31**	5.29	**20.73**	-2.20	0.39
BEL	**28.41**	**9.53**	-0.76	2.03	2.08	**-7.71**	-0.67	0.47	**6.20**	**4.77**	**12.33**	**10.33**	**3.02**	0.30
BGR	**54.74**	**9.45**	2.12	0.91	2.49	-2.15	-1.97	-2.10	**6.38**	**6.74**	**11.38**	**22.38**	**-6.61**	0.39
BRA	**41.43**	**9.96**	2.84	1.86	**3.64**	-2.62	-1.36	**-4.11**	**4.13**	**3.85**	**10.31**	**9.60**	1.10	0.33
CAN	**36.29**	**14.29**	-0.53	-2.18	**6.05**	0.99	0.78	-0.81	**6.92**	**3.30**	1.26	**18.17**	0.17	0.29
CHE	**35.10**	**12.07**	2.27	1.83	**8.06**	-3.08	0.34	**-6.98**	1.39	-1.15	**7.60**	8.03	-1.80	0.39
CHL	**41.24**	**11.00**	0.67	-0.05	**4.22**	**-7.87**	-0.35	**-5.66**	2.35	**3.82**	10.14	9.44	1.10	0.36
COL	**39.40**	**10.55**	1.74	-0.07	2.95	-1.78	0.74	**-7.22**	**6.30**	**6.04**	**8.85**	9.32	**-4.77**	0.31
CRI	**45.19**	**8.82**	0.86	0.66	**4.84**	-0.27	-2.74	-2.51	3.64	5.10	**11.72**	6.98	-1.31	0.33
CZE	**41.12**	**15.57**	2.53	-0.89	**6.48**	-2.18	-0.33	**-4.77**	2.34	0.16	1.16	**16.17**	-1.99	0.40
DEU	**46.44**	**8.99**	-0.04	2.89	**9.54**	-4.21	**-3.24**	**-5.67**	-0.18	0.63	-1.15	**13.59**	2.72	0.55
DNK	**32.70**	**11.30**	2.50	2.74	**8.26**	**-6.37**	1.12	-2.89	0.08	-0.29	**-14.91**	**28.68**	**-4.47**	0.45
ESP	**35.31**	**9.75**	**-1.04**	**0.90**	**4.90**	**-4.53**	**-0.42**	**-2.58**	**5.86**	**3.22**	**5.81**	**7.88**	1.04	**0.28**
EST	**41.13**	**11.96**	1.65	-0.02	**8.63**	-1.73	-2.50	-6.81	3.42	**3.68**	-0.71	**9.01**	0.37	0.45
FIN	**46.72**	**9.36**	2.65	1.62	**6.59**	**-4.31**	1.45	-2.42	**7.28**	**3.65**	4.13	**12.39**	-2.55	0.44
FRA	**39.26**	**12.70**	4.47	3.84	2.77	-3.72	-4.75	-4.36	0.57	**4.80**	1.01	**17.89**	-2.35	0.38
GBR	**27.63**	**19.59**	0.75	0.38	**6.21**	1.70	-1.63	**-4.65**	**7.41**	1.10	2.07	**13.28**	**-3.44**	0.44
GRC	**47.04**	5.30	5.27	3.18	**9.22**	-3.42	-3.07	**-8.38**	3.02	**7.49**	4.30	**15.55**	**-3.27**	0.31
HKG	**28.08**	**12.87**	**6.64**	0.50	**6.46**	-3.92	-0.36	**-5.96**	**6.30**	2.90	**10.40**	**11.56**	**3.68**	0.41
HRV	**47.77**	**8.43**	-1.36	3.10	**7.54**	**-8.68**	2.03	**-6.20**	3.96	**4.95**	5.91	7.14	-1.58	0.46
HUN	**43.72**	**13.15**	-0.47	4.49	4.21	-3.42	-2.62	**-5.21**	2.10	3.28	6.48	**8.54**	0.90	0.42
IDN	**29.42**	**6.60**	-1.08	-1.03	**5.84**	0.21	0.23	-2.19	2.21	2.66	**12.40**	**11.92**	**4.21**	0.15
IRL	**39.94**	**15.57**	-2.46	2.85	**5.19**	-1.52	-3.00	-2.54	3.69	0.93	**14.37**	4.23	-2.74	0.41
ISL	**36.55**	**19.86**	-1.57	-1.32	**6.34**	-1.99	-0.21	-0.66	**6.26**	-2.14	2.29	**33.63**	-2.86	0.43
ISR	**46.85**	**18.49**	0.58	-0.82	2.00	-0.42	-0.65	-1.73	**8.83**	5.51	**12.15**	6.63	1.59	0.32
ITA	**46.68**	**7.17**	**4.84**	1.37	**8.39**	**-4.22**	-0.41	**-8.59**	**8.27**	**3.30**	**5.80**	**8.71**	**-2.20**	0.37

JOR	**40.17**	**18.27**	-0.99	-8.51	3.97	-6.09	0.92	-4.37	-0.01	1.35	10.78	2.45	2.67	0.35
JPN	**36.76**	**11.78**	0.46	-1.35	**6.55**	-2.23	**4.04**	**-3.57**	**6.53**	-1.82	3.17	3.42	0.35	0.30
KAZ	**32.89**	**10.08**	-0.78	3.81	**4.73**	**-5.53**	1.34	-2.90	0.78	**5.86**	**22.31**	6.14	**-6.80**	0.19
KOR	**32.64**	**11.12**	2.81	2.59	**12.81**	**-6.57**	2.11	**-10.42**	5.50	**5.82**	-5.47	**23.17**	-0.52	0.47
LTU	**48.48**	**13.93**	-1.17	-1.48	**7.36**	-2.55	-1.30	-2.65	**3.37**	1.78	2.13	**9.17**	1.14	0.46
LUX	**45.08**	**9.36**	2.20	0.88	**5.03**	**-5.09**	0.70	**-3.44**	3.46	**6.29**	**11.14**	**10.38**	**-2.99**	0.40
LVA	**41.84**	**17.13**	2.10	2.35	**6.80**	-2.36	-3.71	-5.74	**4.24**	3.49	11.61	**16.26**	-0.48	0.40
MAC	**27.91**	5.40	0.85	2.34	**10.98**	**-7.81**	-0.15	-1.01	**4.44**	3.92	4.57	**13.16**	0.45	0.31
MEX	**30.27**	**8.05**	2.12	-1.39	**3.76**	**-6.42**	0.95	-1.23	**3.75**	**3.52**	3.79	**14.17**	**-3.29**	0.24
MNE	**55.85**	**8.56**	0.80	-0.90	4.25	-1.25	-2.51	-1.62	**8.43**	1.92	3.48	7.82	**-3.67**	0.41
MYS	**29.59**	**9.01**	3.34	**-9.59**	3.44	-4.10	-3.11	-1.65	**4.46**	**6.96**	8.71	**25.62**	**4.36**	0.24
NLD	**30.06**	**14.20**	1.75	0.96	3.72	2.36	-2.90	**-7.68**	-2.40	1.21	-5.01	**19.96**	0.07	0.33
NOR	**43.08**	**18.96**	0.51	4.14	0.87	3.03	-2.82	**-5.39**	5.03	2.50	6.79	**14.81**	-0.74	0.37
NZL	**35.98**	**22.10**	-1.59	-2.00	4.26	0.10	2.05	0.41	**10.15**	2.81	3.43	**19.56**	-0.48	0.39
PER	**39.25**	**11.19**	1.91	**-6.06**	3.43	-3.15	0.71	**-4.52**	**4.44**	**8.86**	-5.44	**18.21**	-1.67	0.31
POL	**41.99**	**15.65**	1.79	-1.02	**6.80**	-3.50	**-3.86**	-2.43	**4.58**	**4.67**	1.10	**11.45**	-0.83	0.48
PRT	**44.62**	**16.15**	-0.50	-3.06	**6.01**	**-5.50**	3.49	1.01	**3.52**	0.77	5.81	**15.88**	-0.73	0.39
QAT	**37.80**	**10.50**	1.18	-4.58	**6.64**	-4.31	1.07	0.19	4.24	1.38	7.15	15.32	-4.57	0.20
QCN	**17.90**	**12.81**	0.50	**-8.02**	**14.27**	-1.88	-0.57	-0.99	**7.23**	**3.81**	-4.46	**16.49**	2.47	0.39
QRS	**40.14**	**17.73**	0.13	1.75	8.65	-1.44	**9.38**	-3.85	**8.20**	**-6.69**	14.48	-7.44	**-12.75**	0.31
ROU	**40.98**	**10.55**	1.84	1.77	**3.76**	-3.60	-0.79	-2.30	**4.33**	3.14	4.28	**12.61**	-2.23	0.23
RUS	**30.25**	6.82	4.31	-0.53	**5.95**	-3.23	-0.21	2.04	**10.12**	0.38	5.07	-0.41	**-8.03**	0.24
SGP	**23.31**	**17.16**	-0.48	-2.44	**7.57**	-3.12	0.55	-1.63	**6.19**	2.41	1.37	**23.14**	**-3.13**	0.31
SRB	**45.64**	**11.82**	0.28	0.14	**5.41**	**-5.84**	2.24	**-6.74**	**8.39**	3.63	**11.34**	4.97	-0.80	0.36
SVK	**39.44**	**16.91**	0.64	1.20	3.35	-3.37	0.73	**-4.24**	**5.67**	**5.01**	2.76	5.98	-0.23	0.41
SVN	**49.17**	**16.44**	3.08	2.29	**4.10**	-4.09	-0.52	-5.80	**4.88**	**6.47**	10.74	6.94	1.27	0.50
SWE	**40.39**	**11.97**	1.45	3.23	3.87	**-5.24**	-2.45	**-8.00**	1.37	3.36	-0.29	**17.66**	-4.95	0.32
TAP	**30.98**	**14.44**	-0.64	1.62	**11.80**	-5.81	-2.51	0.14	1.56	1.83	5.89	**13.99**	**6.18**	0.46
THA	**36.66**	**15.12**	-2.47	1.42	**7.38**	-8.03	-0.62	-3.73	**8.97**	4.08	**10.94**	**12.57**	-0.22	0.30
TUN	**41.18**	**8.39**	0.30	-5.67	2.36	-3.15	0.18	3.21	3.42	1.83	0.72	**13.54**	0.14	0.22
TUR	**48.18**	**7.00**	1.68	3.03	**9.74**	**-5.12**	-1.87	**-7.11**	0.29	2.00	3.65	**12.03**	-0.40	0.33
URY	**41.82**	**14.69**	0.26	-1.16	0.85	-4.89	4.54	-3.62	**4.76**	**4.19**	2.15	**15.75**	1.17	0.29

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USA	**26.01**	**8.43**	1.53	3.03	**7.00**	**-4.44**	1.31	**-3.90**	**7.58**	**3.34**	**17.54**	**15.97**	1.84	0.37
VNM	**34.69**	**16.51**	-0.65	-2.87	**15.77**	**-7.76**	0.05	**-13.33**	**6.21**	**5.82**	8.27	0.21	1.93	0.32
ALL average	38.80	12.35	1.02	0.05	5.98	-3.55	-0. 30	-3.65	4.59	3.13	5.59	12.65	-0.99	0.36
OECD average	39.03	12.88	1.21	1.09	5.91	-3.27	-0.68	-4.18	4.30	2.86	4.20	13.77	-0.93	0.38
Number[35]	62	59	3	4	43	19	6	25	38	31	20	44	18	

[35] Number= Number of countries with significant p <= 0.05

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Table 4. The effect of gender in the basic model and in model 2 and the difference between them, by country. (Lines in gray represent OECD countries)

COUNTRY	GENDER COEFFICIENT IN BASIC MODEL	GENDER COEFFICIENT IN MODEL 2	DIFFERENCE BETWEEN THE TWO MODELS	R^2 IN BASIC MODEL	R^2 IN MODEL 2	INCREASE IN EXPLAINED VARIANCE
ARE	51.39	46.63	4.76	0.25	0.40	0.15
ARG	51.71	47.38	4.33	0.20	0.30	0.11
AUS	47.19	32.16	15.03	0.23	0.39	0.16
BEL	39.57	28.41	11.17	0.16	0.30	0.15
BGR	66.09	54.74	11.35	0.25	0.39	0.14
BRA	48.44	41.43	7.01	0.21	0.33	0.12
CAN	45.30	36.29	9.02	0.17	0.29	0.12
CHE	48.13	35.10	13.03	0.25	0.39	0.14
CHL	49.36	41.24	8.11	0.24	0.36	0.12
COL	44.13	39.40	4.73	0.19	0.31	0.12
CRI	49.03	45.19	3.84	0.23	0.33	0.11
CZE	49.26	41.12	8.13	0.22	0.40	0.18
DEU	57.70	46.44	11.27	0.37	0.55	0.18
DNK	44.21	32.70	11.51	0.22	0.45	0.23
ESP	44.96	35.31	9.65	0.18	0.28	0.10
EST	48.87	41.13	7.74	0.27	0.45	0.18
FIN	58.94	46.72	12.22	0.29	0.44	0.15
FRA	50.13	39.26	10.87	0.21	0.38	0.17
GBR	36.79	27.63	9.16	0.18	0.44	0.26
GRC	58.58	47.04	11.53	0.20	0.31	0.11
HKG	39.58	28.08	11.50	0.17	0.41	0.25
HRV	56.75	47.77	8.98	0.32	0.46	0.14
HUN	49.50	43.72	5.78	0.26	0.42	0.16
IDN	34.02	29.42	4.59	0.11	0.15	0.04
IRL	48.00	39.94	8.06	0.28	0.41	0.13
ISL	45.36	36.55	8.81	0.19	0.43	0.23
ISR	57.11	46.85	10.26	0.20	0.32	0.12
ITA	56.59	46.68	9.91	0.25	0.37	0.12
JOR	62.16	40.17	21.99	0.27	0.35	0.08
JPN	42.15	36.76	5.39	0.18	0.30	0.12
KAZ	37.45	32.89	4.56	0.11	0.19	0.08
KOR	41.37	32.64	8.73	0.18	0.47	0.29
LTU	55.45	48.48	6.97	0.32	0.46	0.14
LUX	55.04	45.08	9.96	0.24	0.40	0.17
LVA	50.45	41.84	8.61	0.25	0.40	0.15
MAC	39.52	27.91	11.62	0.14	0.31	0.17
MEX	37.67	30.27	7.41	0.14	0.24	0.09
MNE	62.16	55.85	6.31	0.30	0.41	0.11
MYS	33.27	29.59	3.68	0.10	0.24	0.14
NLD	38.11	30.06	8.05	0.17	0.33	0.16
NOR	48.46	43.08	5.38	0.19	0.37	0.18
NZL	47.70	35.98	11.72	0.19	0.39	0.20
PER	39.67	39.25	0.42	0.15	0.31	0.17
POL	46.35	41.99	4.36	0.20	0.48	0.28
PRT	50.13	44.62	5.52	0.22	0.39	0.17

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QAT	41.20	37.80	3.40	0.13	0.20	0.07
QCN	29.08	17.90	11.18	0.10	0.39	0.29
QRS	44.72	40.14	4.58	0.14	0.31	0.17
ROU	43.69	40.98	2.71	0.14	0.23	0.09
RUS	38.57	30.25	8.33	0.11	0.24	0.13
SGP	27.61	23.31	4.30	0.09	0.31	0.22
SRB	55.11	45.64	9.47	0.25	0.36	0.11
SVK	49.37	39.44	9.93	0.19	0.41	0.22
SVN	55.58	49.17	6.41	0.27	0.50	0.23
SWE	48.64	40.39	8.25	0.19	0.32	0.13
TAP	37.98	30.98	7.00	0.13	0.46	0.33
THA	43.08	36.66	6.42	0.16	0.30	0.14
TUN	45.77	41.18	4.59	0.14	0.22	0.07
TUR	50.94	48.18	2.77	0.21	0.33	0.12
URY	46.63	41.82	4.81	0.16	0.29	0.13
USA	35.31	26.01	9.30	0.17	0.37	0.20
VNM	40.70	34.69	6.02	0.15	0.32	0.16
ALL average	46.74	38.68	8.06	0.20	0.36	0.16
OECD average	47.95	39.03	8.92	0.22	0.38	0.17

Table 5 (a and b). The effect of student and school characteristics (based on students' view) on DIFmathread (the within-person difference between maths and reading achievement), by country. (column names in yellow represent the variables added to the model at this stage; Lines in green represent OECD countries; in bold, coefficients statistically significant at $p \leq 0.05$)

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Table 5a.

COUNTRY	GENDER	SCMAT	INTMAT	INSTMOT	MATHEFF	ANXMAT	FAILMAT	MATWKETH	MATINTFC	MATBEH	CONT_MAT	CONT_GEN	ESCS
ARE	**46.92**	**12.85**	2.70	-4.19	0.79	-5.82	1.26	-1.26	2.55	4.50	-2.20	**20.48**	-0.54
ARG	**47.49**	**9.50**	-1.64	1.25	**5.72**	-1.60	-0.18	-1.62	**4.66**	2.82	**11.71**	**10.11**	2.94
AUS	**32.54**	**10.69**	0.97	0.63	**8.14**	**-3.87**	**-3.02**	-1.74	**6.21**	**2.17**	4.49	**20.66**	-0.90
BEL	**28.76**	**10.43**	-0.29	1.64	2.35	**-6.60**	1.12	0.32	**5.78**	**4.05**	**9.93**	**10.38**	2.09
BGR	**52.06**	**9.28**	0.70	-0.18	**4.14**	-3.21	-0.98	-1.19	**8.11**	**4.75**	**9.71**	**18.69**	1.37
BRA	**41.20**	**10.37**	2.06	1.56	**3.09**	**-3.05**	-1.53	**-4.11**	**4.43**	**3.65**	**10.11**	**9.31**	1.20
CAN	**36.25**	**14.29**	-0.61	-2.12	**5.40**	0.47	0.30	-1.39	**6.92**	**3.35**	2.45	**18.17**	1.13
CHE	**35.22**	**12.52**	2.18	1.40	**8.62**	-2.15	0.75	**-6.75**	1.36	-1.40	**6.28**	**9.21**	-0.89
CHL	**41.30**	**10.98**	0.80	-0.31	**4.25**	**-7.77**	-0.13	**-5.49**	2.13	**3.33**	9.53	9.30	1.33
COL	**39.21**	**10.04**	1.43	-0.01	3.23	-1.93	0.87	**-6.96**	**6.38**	**5.18**	7.46	9.84	-1.62
CRI	**44.56**	**9.30**	0.11	-0.05	**5.23**	-0.10	-2.59	-2.10	4.14	4.02	10.57	7.59	0.79
CZE	**41.34**	**16.70**	1.76	-0.56	**5.52**	-2.39	0.04	**-4.82**	1.87	0.57	2.43	**16.65**	-3.10
DEU	**47.05**	**9.28**	0.62	3.00	**8.64**	-3.75	-3.30	**-6.20**	0.01	0.92	-0.59	**12.97**	0.92
DNK	**32.30**	**11.20**	2.15	2.79	**8.76**	**-6.36**	1.17	-2.83	0.12	0.28	**-15.00**	**29.20**	**-3.67**
ESP	**35.16**	**9.72**	-0.88	0.96	**5.08**	**-4.63**	-0.60	-2.77	**5.79**	**3.06**	**6.06**	**8.23**	0.87
EST	**41.30**	**11.51**	1.66	-0.23	**8.81**	-2.25	-2.37	**-7.44**	3.37	**4.08**	-0.20	**8.21**	1.62
FIN	**46.67**	**9.62**	2.61	1.51	**6.18**	**-4.11**	1.30	-2.72	**7.31**	**3.60**	2.65	**13.83**	-2.16
FRA	**37.22**	**13.65**	2.86	4.36	3.49	-3.98	-3.70	**-5.10**	1.15	**4.43**	1.10	**17.59**	-0.56
GBR	**27.35**	**19.19**	0.62	0.40	**6.80**	0.93	-1.21	**-5.13**	**7.41**	1.01	3.22	**12.68**	-0.97
GRC	**43.88**	5.04	4.64	2.68	**9.90**	**-4.66**	-3.24	**-7.85**	4.51	**6.45**	2.92	**16.08**	0.66
HKG	**28.77**	**13.38**	**6.97**	0.45	**5.86**	-3.66	-0.03	**-5.99**	**6.20**	2.58	**9.59**	**12.37**	2.77
HRV	**46.73**	**8.90**	-1.58	2.16	**6.92**	**-8.56**	2.30	**-5.67**	**4.68**	**4.92**	5.98	7.43	-2.38
HUN	**44.00**	**12.67**	-0.85	**5.29**	3.40	-3.17	**-4.33**	**-5.40**	2.08	**3.79**	6.26	**8.89**	-1.54
IDN	**28.62**	5.53	-0.82	-1.20	**6.08**	-0.40	-0.19	-2.05	2.25	2.78	11.42	11.72	**4.07**
IRL	**40.06**	**15.60**	-2.39	2.77	**5.32**	-1.35	-2.97	-2.41	**3.68**	1.11	**14.17**	3.81	-2.91
ISL	**36.79**	**19.95**	-1.67	-0.66	**6.53**	-1.78	-0.25	-0.97	**5.58**	-2.39	4.61	**31.15**	-1.67
ISR	**47.04**	**19.78**	0.61	-1.44	1.98	0.47	-0.62	-1.38	**7.60**	4.65	**13.30**	6.23	2.30
ITA	**45.88**	**7.31**	**4.69**	1.19	**8.63**	**-4.12**	-0.32	**-8.31**	**8.10**	**2.92**	**5.15**	**8.09**	-1.12
JOR	**34.85**	**17.04**	-4.56	-7.24	2.93	-9.36	0.94	-1.57	-0.29	2.94	12.38	3.74	1.62
JPN	**36.65**	**12.11**	0.24	-1.58	**5.69**	-2.78	**4.19**	**-3.85**	**6.54**	-1.84	2.88	3.26	-0.94
KAZ	**32.82**	**9.55**	-2.84	2.04	**5.29**	**-5.96**	2.44	-2.15	2.425	3.73	**19.74**	4.26	0.28
KOR	**33.96**	**12.35**	1.91	2.40	**10.89**	**-6.32**	1.60	**-9.76**	**5.44**	**5.14**	-3.84	**22.82**	-1.23
LTU	**48.68**	**13.75**	-0.74	-1.54	**7.29**	-2.54	-0.96	**-2.86**	**3.42**	1.59	1.74	**8.39**	1.76
LUX	**44.23**	**8.99**	2.22	0.83	**5.23**	**-5.57**	0.78	**-3.49**	3.77	**5.86**	**10.93**	**10.20**	-1.30
LVA	**42.13**	**17.74**	1.45	2.38	**6.77**	-2.67	-3.36	**-6.35**	**4.57**	3.55	12.59	**15.96**	0.87
MAC	**28.83**	**7.10**	0.66	2.77	**9.33**	**-6.65**	-0.43	-0.61	**4.13**	3.06	4.97	**12.09**	-0.53
MEX	**30.20**	**8.14**	1.89	-1.35	**3.97**	**-6.39**	1.00	-1.12	**3.83**	**3.35**	3.51	**14.01**	**-2.58**
MNE	**55.37**	**8.52**	0.48	-0.55	4.31	-1.59	-2.49	-1.50	**8.33**	1.81	2.75	8.01	-2.80
MYS	**30.26**	**10.28**	0.79	-5.07	0.73	-4.49	-2.22	0.41	**4.23**	**7.52**	8.34	**19.70**	-0.75
NLD	**30.14**	**13.75**	1.42	1.43	4.23	2.26	-3.09	**-7.63**	-2.53	1.22	-5.03	**19.19**	0.14
NOR	**42.85**	**18.81**	0.73	4.24	1.35	2.85	-2.67	**-5.81**	**5.09**	2.47	7.50	**14.73**	0.92
NZL	**36.53**	**23.07**	-2.32	-1.38	3.20	0.06	2.11	0.54	**9.74**	3.15	4.52	**18.12**	-3.45

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PER	**39.71**	**10.63**	2.59	**-5.79**	3.63	-3.11	0.33	**-4.50**	**4.29**	**8.11**	-6.03	**18.30**	-1.46
POL	**41.69**	**15.24**	1.82	-0.68	**6.76**	-3.47	**-3.91**	-2.42	**4.51**	**4.54**	0.83	**10.30**	-0.61
PRT	**44.30**	**16.24**	-0.01	-2.89	**6.31**	**-5.20**	3.14	1.04	**3.34**	0.38	5.36	**16.48**	-0.64
QAT	**37.95**	**9.43**	1.24	-4.19	**5.68**	-3.47	0.21	1.04	4.87	0.54	5.09	13.54	-3.09
QCN	**19.31**	**13.50**	0.32	**-7.76**	**12.03**	-1.73	-0.35	-0.78	**6.92**	**3.90**	-3.99	**16.02**	0.66
QRS	**38.62**	**14.94**	1.67	0.87	**9.94**	-3.12	**10.31**	-3.45	**8.40**	**-5.76**	11.08	-5.69	**-11.23**
ROU	**40.36**	**10.18**	1.65	1.93	**4.59**	-4.30	0.03	-3.65	**4.72**	3.50	5.16	**13.33**	2.22
RUS	**29.08**	5.31	4.03	-2.35	**8.89**	**-4.57**	0.54	1.11	**10.77**	-1.27	2.41	-0.01	0.20
SGP	**23.50**	**17.60**	-0.52	-2.34	**7.48**	-2.87	0.44	-1.64	**6.04**	2.44	1.24	**23.48**	-3.34
SRB	**47.06**	**11.40**	0.80	0.35	4.48	-5.21	2.23	**-7.08**	**8.49**	**4.02**	**11.32**	5.27	-2.26
SVK	**38.85**	**15.88**	0.71	0.55	**4.83**	-4.13	0.89	**-4.42**	**5.55**	**4.42**	3.29	5.79	3.44
SVN	**50.50**	**15.83**	2.93	2.69	2.91	-4.84	-0.03	-5.44	**5.26**	**6.19**	10.46	6.92	-3.88
SWE	**39.90**	**11.45**	1.78	3.11	4.37	**-5.24**	-2.52	**-8.02**	1.34	**3.66**	-0.37	**17.44**	-4.69
TAP	**31.56**	**14.67**	0.31	1.68	**10.56**	**-5.88**	-2.22	0.02	1.25	1.13	6.29	**13.78**	3.92
THA	**36.04**	**15.45**	-2.39	1.32	**7.18**	**-7.66**	-0.27	-3.99	**9.02**	4.22	**10.39**	**12.48**	0.45
TUN	**40.90**	**8.13**	0.19	-5.31	2.53	-3.61	0.32	3.16	3.40	1.49	0.02	**12.20**	0.43
TUR	**49.55**	**6.85**	2.20	2.77	**6.85**	-4.49	-1.95	**-6.00**	-0.08	3.18	7.51	8.21	-2.90
URY	**41.48**	**14.73**	0.21	-1.53	1.66	-4.86	**4.75**	-3.44	**5.17**	3.66	1.06	**16.17**	2.97
USA	**25.55**	**9.34**	0.68	3.01	**7.30**	**-4.14**	1.30	**-3.33**	**7.57**	**3.77**	**18.57**	**14.03**	0.69
VNM	**36.91**	**14.67**	-0.06	-2.47	**13.59**	-6.57	-1.59	**-12.26**	**5.77**	**6.82**	9.82	1.60	-1.16
ALL Average	38.64	12.29	0.82	0.06	5.83	-3.66	-0.21	-3.53	4.67	2.96	5.41	12.31	-0.46
OECD Average	38.94	12.98	1.08	1.10	5.81	-3.29	-0.62	-4.18	4.25	2.77	4.39	13.42	-0.78
Number	62	59	2	3	44	19	6	28	41	28	16	43	2

Table 5b.

COUNTRY	STUDREL.M	COGACT.M	TCHBEHTD.M	TCHBEHSO.M	TCHBEHFA.M	DISCLIMA.M	MTSUP.M	CLSMAN.M	ESCS.M	R^2
ARE	13.62	7.50	-6.79	2.55	-14.24	-3.34	4.32	0.76	0.26	0.41
ARG	3.42	-2.20	-11.74	0.54	**21.20**	4.79	-14.78	-2.56	**-9.62**	0.33
AUS	-4.74	6.76	-2.97	-1.49	-3.76	**14.15**	0.60	**-15.09**	-5.57	0.40
BEL	8.45	9.29	-8.92	**10.81**	1.80	2.24	-15.24	0.72	2.45	0.32
BGR	7.86	17.72	-8.97	**24.89**	**-26.73**	7.93	-0.30	-15.28	**-12.93**	0.43
BRA	7.10	**12.20**	-9.55	0.51	0.07	-7.15	2.45	3.08	-0.97	0.34
CAN	**14.85**	6.75	3.65	2.50	**-15.34**	-7.06	-11.00	**14.90**	-6.32	0.31
CHE	2.33	0.71	-0.12	5.75	-3.27	8.31	-5.69	-2.21	-5.41	0.41
CHL	3.44	6.43	-3.69	-1.70	10.25	6.91	-8.58	-2.57	-1.54	0.37
COL	-1.53	-0.04	-15.08	11.73	10.86	14.17	2.93	-8.37	**-7.75**	0.33
CRI	8.60	11.64	-12.88	5.98	5.26	3.11	4.59	-7.39	-5.99	0.35
CZE	3.05	-2.50	8.82	4.93	-3.95	8.82	-7.14	-2.40	4.41	0.41
DEU	2.76	-3.94	-2.45	3.99	-5.44	3.68	2.28	0.49	7.52	0.56
DNK	3.28	-6.35	2.63	-0.11	-7.98	-4.62	9.54	-3.12	-4.84	0.45
ESP	1.92	5.44	-12.52	2.39	3.19	5.42	2.44	-2.49	0.52	0.28
EST	-3.81	6.70	-6.48	1.48	-2.83	4.98	7.91	-2.32	-5.68	0.46
FIN	10.04	-4.75	3.81	5.08	-0.87	9.73	-18.63	-0.13	-1.22	0.45
FRA	-0.28	3.32	-4.75	4.06	13.53	7.46	0.70	2.46	-7.08	0.40
GBR	0.48	-3.59	-2.13	**14.39**	-9.27	**13.43**	2.07	-3.15	**-7.78**	0.46
GRC	8.27	13.17	10.65	11.49	0.19	-9.22	-14.95	5.94	-6.82	0.34
HKG	2.77	10.64	25.24	-9.13	-11.42	-2.19	-13.96	-7.71	-0.06	0.43
HRV	**12.35**	10.56	4.57	2.59	5.20	-0.34	-10.83	-4.59	5.38	0.48
HUN	7.11	17.41	**-22.87**	1.91	-4.20	-7.00	3.65	6.64	6.44	0.45
IDN	3.61	0.62	-8.27	-3.42	11.37	-15.10	-3.46	5.44	-0.93	0.16
IRL	-1.36	-8.08	-2.04	1.05	-4.08	-6.17	12.01	3.22	-0.15	0.42
ISL	-9.74	15.37	6.32	-10.27	**-13.44**	-8.71	4.36	4.70	-9.20	0.45
ISR	-13.34	15.17	-0.46	11.87	-2.82	16.09	9.23	-12.84	-1.65	0.34
ITA	-4.82	6.74	7.30	8.32	-6.28	-5.67	**-12.84**	5.36	-2.56	0.38
JOR	12.42	10.43	5.02	5.60	-3.56	10.47	**-54.61**	-6.71	3.69	0.42
JPN	-4.78	7.57	-4.68	-4.07	13.36	-0.22	-8.77	10.37	0.99	0.31
KAZ	18.29	6.63	-2.35	6.50	-13.48	3.49	4.11	-4.87	**-29.91**	0.24
KOR	5.87	-2.86	-13.22	-22.54	15.06	11.39	8.56	-2.35	-3.76	0.49
LTU	-1.13	4.45	-11.88	8.45	-2.51	7.56	-4.55	2.76	-3.78	0.47
LUX	4.01	14.70	14.16	-7.77	27.73	-2.03	**-37.16**	12.70	-2.43	0.41
LVA	-6.11	-7.06	3.35	5.91	-15.86	6.16	14.58	-4.40	-4.82	0.42
MAC	**26.83**	23.10	**-41.18**	7.58	**-19.46**	11.01	-11.62	**30.59**	-5.99	0.34
MEX	-0.50	-3.55	5.36	1.54	-1.48	0.79	-3.07	-0.84	-1.29	0.24
MNE	-8.64	1.89	-5.23	3.08	-7.41	-4.66	6.05	-7.57	-14.23	0.42
MYS	-15.73	**38.63**	-13.36	-12.02	-5.11	5.52	-7.11	-17.75	-1.62	0.33
NLD	-2.35	3.78	-5.27	6.63	-1.21	0.82	-2.91	-2.16	3.28	0.34
NOR	3.07	-4.94	-2.05	-4.49	8.13	4.57	-1.86	-0.30	-11.65	0.38
NZL	-5.84	-5.59	-12.75	5.70	9.21	-9.85	2.31	23.89	14.18	0.41
PER	-10.99	16.92	-14.38	2.78	7.65	6.28	-4.66	-3.55	-2.03	0.33
POL	-10.86	4.37	-0.89	9.43	9.66	14.98	-14.15	-6.96	1.27	0.50
PRT	7.49	-7.95	4.24	1.20	0.40	-12.55	-14.03	10.43	-0.10	0.40
QAT	4.83	3.26	-31.04	4.15	18.39	-6.02	-2.09	1.93	0.25	0.23
QCN	0.70	**24.50**	4.17	-11.16	-13.79	5.40	-1.03	-8.10	-1.79	0.42
QRS	16.33	19.59	-33.89	7.62	-26.56	5.53	-12.77	14.34	-25.66	0.35
ROU	8.86	-11.61	5.52	3.33	12.47	**19.16**	-10.09	-1.93	**-12.40**	0.26
RUS	9.43	5.22	-3.00	21.25	-12.70	14.85	-9.38	-11.29	**-27.53**	0.29
SGP	-5.43	-10.92	12.54	0.28	-13.15	-1.32	**20.03**	-4.38	2.62	0.32
SRB	6.44	1.74	1.73	-12.31	10.26	7.97	-1.34	-4.15	4.95	0.37
SVK	-2.85	-2.25	4.98	7.54	0.20	5.26	1.81	-4.17	-6.87	0.42
SVN	-1.51	8.21	6.90	**9.67**	-19.38	0.25	-5.74	1.42	**13.68**	0.52
SWE	-3.70	-15.16	-6.15	6.00	9.37	4.05	7.34	-6.24	4.18	0.33
TAP	15.81	14.01	-11.51	-6.11	-7.84	2.65	-0.36	-1.44	7.35	0.48
THA	9.93	-10.89	-10.04	-10.63	20.82	1.52	1.32	-1.92	-0.78	0.31
TUN	-7.28	3.11	-8.32	**19.03**	-4.71	1.69	-3.16	0.90	1.95	0.23
TUR	-7.85	10.57	11.24	-13.13	2.83	13.83	-12.45	-4.65	3.77	0.36
URY	5.30	-7.67	-17.48	11.55	-2.59	-8.09	3.70	4.42	-2.99	0.31
USA	-8.05	-0.36	-8.71	11.45	8.59	6.25	0.77	-17.25	**11.62**	0.40
VNM	0.19	20.76	6.81	-10.35	-9.01	22.71	-7.84	-15.76	5.60	0.34
ALL Average	2.22	4.92	-3.89	2.65	-0.95	3.29	-3.68	-1.02	-2.54	0.38
OECD Average	0.00	2.74	-1.00	2.53	0.85	2.74	-3.60	0.36	-0.53	0.40
Number	2	2	2	4	5	3	4	2	8	

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Table 6. The effect of gender in the basic model, in model 2 and in model 3, and the difference between them, by country. (Lines in gray represent OECD countries)

COUNTRY	GENDER COEFFICIENT IN BASIC MODEL	GENDER COEFFICIENT IN MODEL 2	GENDER COEFFICIENT IN MODEL 3	DIFFERENCE BETWEEN MODEL2 AND 3	R^2 IN BASIC MODEL	R^2 IN MODEL 2	INCREASE IN EXPLAINED VARIANCE (MODEL2-BASIC MODEL)	R^2 IN MODEL 3	INCREASE IN EXPLAINED VARIANCE (MODEL3-MODEL2)
ARE	51.39	46.63	46.92	-0.29	0.25	0.40	0.15	0.41	0.01
ARG	51.71	47.38	47.49	-0.11	0.20	0.30	0.11	0.33	0.03
AUS	47.19	32.16	32.54	-0.38	0.23	0.39	0.16	0.40	0.01
BEL	39.57	28.41	28.76	-0.35	0.16	0.30	0.15	0.32	0.02
BGR	66.09	54.74	52.06	2.68	0.25	0.39	0.14	0.43	0.04
BRA	48.44	41.43	41.20	0.23	0.21	0.33	0.12	0.34	0.01
CAN	45.30	36.29	36.25	0.04	0.17	0.29	0.12	0.31	0.02
CHE	48.13	35.10	35.22	-0.12	0.25	0.39	0.14	0.41	0.01
CHL	49.36	41.24	41.30	-0.06	0.24	0.36	0.12	0.37	0.01
COL	44.13	39.40	39.21	0.19	0.19	0.31	0.12	0.33	0.02
CRI	49.03	45.19	44.56	0.63	0.23	0.33	0.11	0.35	0.02
CZE	49.26	41.12	41.34	-0.22	0.22	0.40	0.18	0.41	0.01
DEU	57.70	46.44	47.05	-0.61	0.37	0.55	0.18	0.56	0.01
DNK	44.21	32.70	32.30	0.40	0.22	0.45	0.23	0.45	0.01
ESP	44.96	35.31	35.16	0.15	0.18	0.28	0.10	0.28	0.01
EST	48.87	41.13	41.30	-0.17	0.27	0.45	0.18	0.46	0.01
FIN	58.94	46.72	46.67	0.05	0.29	0.44	0.15	0.45	0.01
FRA	50.13	39.26	37.22	2.04	0.21	0.38	0.17	0.40	0.02
GBR	36.79	27.63	27.35	0.28	0.18	0.44	0.26	0.46	0.02
GRC	58.58	47.04	43.88	3.16	0.20	0.31	0.11	0.34	0.03
HKG	39.58	28.08	28.77	-0.69	0.17	0.41	0.25	0.43	0.01
HRV	56.75	47.77	46.73	1.04	0.32	0.46	0.14	0.48	0.01
HUN	49.50	43.72	44.00	-0.28	0.26	0.42	0.16	0.45	0.02
IDN	34.02	29.42	28.62	0.80	0.11	0.15	0.04	0.16	0.01
IRL	48.00	39.94	40.06	-0.12	0.28	0.41	0.13	0.42	0.01
ISL	45.36	36.55	36.79	-0.24	0.19	0.43	0.23	0.45	0.02

ISR	57.11	46.85	47.04	-0.19	0.20	0.32	0.12	0.34	0.02
ITA	56.59	46.68	45.88	0.80	0.25	0.37	0.12	0.38	0.01
JOR	62.16	40.17	34.85	5.32	0.27	0.35	0.08	0.42	0.07
JPN	42.15	36.76	36.65	0.11	0.18	0.30	0.12	0.31	0.01
KAZ	37.45	32.89	32.82	0.07	0.11	0.19	0.08	0.24	0.04
KOR	41.37	32.64	33.96	-1.32	0.18	0.47	0.29	0.49	0.02
LTU	55.45	48.48	48.68	-0.20	0.32	0.46	0.14	0.47	0.01
LUX	55.04	45.08	44.23	0.85	0.24	0.40	0.17	0.41	0.01
LVA	50.45	41.84	42.13	-0.29	0.25	0.40	0.15	0.42	0.01
MAC	39.52	27.91	28.83	-0.92	0.14	0.31	0.17	0.34	0.03
MEX	37.67	30.27	30.20	0.07	0.14	0.24	0.09	0.24	0.00
MNE	62.16	55.85	55.37	0.48	0.30	0.41	0.11	0.42	0.01
MYS	33.27	29.59	30.26	-0.67	0.10	0.24	0.14	0.33	0.09
NLD	38.11	30.06	30.14	-0.08	0.17	0.33	0.16	0.34	0.01
NOR	48.46	43.08	42.85	0.23	0.19	0.37	0.18	0.38	0.01
NZL	47.70	35.98	36.53	-0.55	0.19	0.39	0.20	0.41	0.01
PER	39.67	39.25	39.71	-0.46	0.15	0.31	0.17	0.33	0.01
POL	46.35	41.99	41.69	0.30	0.20	0.48	0.28	0.50	0.02
PRT	50.13	44.62	44.30	0.32	0.22	0.39	0.17	0.40	0.01
QAT	41.20	37.80	37.95	-0.15	0.13	0.20	0.07	0.23	0.02
QCN	29.08	17.90	19.31	-1.41	0.10	0.39	0.29	0.42	0.03
QRS	44.72	40.14	38.62	1.52	0.14	0.31	0.17	0.35	0.04
ROU	43.69	40.98	40.36	0.62	0.14	0.23	0.09	0.26	0.03
RUS	38.57	30.25	29.08	1.17	0.11	0.24	0.13	0.29	0.05
SGP	27.61	23.31	23.50	-0.19	0.09	0.31	0.22	0.32	0.01
SRB	55.11	45.64	47.06	-1.42	0.25	0.36	0.11	0.37	0.01
SVK	49.37	39.44	38.85	0.59	0.19	0.41	0.22	0.42	0.01
SVN	55.58	49.17	50.50	-1.33	0.27	0.50	0.23	0.52	0.03
SWE	48.64	40.39	39.90	0.49	0.19	0.32	0.13	0.33	0.01
TAP	37.98	30.98	31.56	-0.58	0.13	0.46	0.33	0.48	0.02
THA	43.08	36.66	36.04	0.62	0.16	0.30	0.14	0.31	0.01
TUN	45.77	41.18	40.90	0.28	0.14	0.22	0.07	0.23	0.01

TUR	50.94	48.18	49.55	-1.37	0.21	0.33	0.12	0.36	0.03
URY	46.63	41.82	41.48	0.34	0.16	0.29	0.13	0.31	0.02
USA	35.31	26.01	25.55	0.46	0.17	0.37	0.20	0.40	0.03
VNM	40.70	34.69	36.91	-2.22	0.15	0.32	0.16	0.34	0.02
ALL average	46.74	38.68	38.42	0.26	0.20	0.36	0.16	0.38	0.02
OECD average	47.95	39.03	38.94	0.09	0.22	0.38	0.17	0.40	0.01

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Table 7 (a, b, c and d). The effect of student and school characteristics (based on students' view and principal's view) on DIFmathread (the within-person difference between maths and reading achievement), by country. (column names in yellow represent the variables added to the model at this stage; Lines in gray represent OECD countries; in bold, coefficients statistically significant at $p \leq 0.05$)

Table 7a.

COUNTRY	GENDER	SCMAT	INTMAT	INSTMOT	MATHEFF	ANXMAT	FAILMAT	MATWKETH	MATINTFC	MATBEH	CONT_MAT	CONT_GEN	ESCS
ARE	**42.98**	**12.66**	3.82	-3.89	1.33	-6.44	1.52	-2.12	**6.33**	3.03	4.53	**14.51**	1.32
ARG	**46.23**	**7.18**	-2.45	1.87	4.29	-2.00	-0.83	-0.60	**6.33**	2.99	**12.93**	**11.92**	3.61
AUS	**33.9**	**10.58**	0.63	0.88	**8.22**	**-4.05**	**-3.62**	-1.52	**6.03**	1.79	5.13	**21.05**	-1.38
BEL	**27.62**	**13.48**	-0.30	2.73	0.91	**-5.39**	1.92	0.03	**4.54**	**3.85**	**9.65**	**10.60**	1.87
BGR	**51.91**	**9.05**	-0.60	0.97	**4.62**	-4.41	-0.91	-1.47	**7.55**	**4.67**	10.73	**20.34**	1.08
BRA	**40.95**	**10.70**	1.85	1.34	2.44	-2.35	-1.81	**-3.55**	**4.88**	**3.23**	**11.64**	7.23	0.76
CAN	**35.49**	**12.92**	-0.56	-1.98	**4.83**	-0.13	-0.51	-1.28	**6.58**	**3.92**	3.04	**17.86**	1.55
CHE	**35**	**12.65**	1.02	1.84	**8.20**	-1.82	0.63	**-6.78**	1.95	-0.51	6.83	8.09	-1.25
CHL	**41.02**	**10.68**	1.01	-0.26	3.59	**-7.79**	-0.04	**-5.62**	2.02	**3.50**	8.87	9.10	1.51
COL	**39.46**	**9.23**	1.92	0.40	3.64	-1.71	0.84	**-8.36**	**5.65**	**5.37**	6.79	9.00	-1.32
CRI	**43.64**	**9.60**	-0.33	1.77	3.58	0.89	-2.63	-1.80	2.26	5.54	**13.62**	5.03	0.86
CZE	**40.8**	**14.22**	3.65	0.31	5.00	-5.58	0.32	**-6.63**	1.45	-0.01	2.57	**17.80**	-3.20
DEU	**46.33**	**9.36**	0.06	3.28	**8.56**	-3.79	**-4.67**	**-6.21**	0.07	1.10	-1.22	**15.73**	0.85
DNK	**32.82**	**11.76**	2.88	2.76	**9.28**	-5.00	0.94	-3.18	-1.20	0.77	**-13.78**	**24.92**	**-4.65**
ESP	**35.15**	**10.06**	-1.58	0.85	**4.80**	**-4.92**	-0.44	-2.57	**5.45**	**4.00**	5.91	**7.70**	0.67
EST	**40.53**	**11.79**	2.70	-0.10	**8.07**	-2.39	**-4.18**	**-7.03**	3.41	**3.58**	1.98	6.82	1.76
FIN	**47.73**	**10.84**	1.86	1.53	4.31	**-4.38**	0.95	-2.95	**7.60**	**3.60**	1.92	**15.06**	-1.46
FRA	**38.18**	**13.49**	1.37	5.85	3.38	-5.42	-4.68	-4.28	1.27	3.66	2.24	**16.68**	-0.93
GBR	**28.67**	**18.85**	1.23	-0.57	**6.21**	1.20	-0.69	**-4.05**	**6.85**	1.08	2.24	**12.08**	-0.35
GRC	**45.89**	**6.09**	2.91	5.52	**9.10**	-3.62	-3.31	**-8.24**	3.40	**6.94**	3.82	**16.30**	-0.51
HKG	**29.34**	**13.33**	**7.56**	0.45	**5.70**	-2.77	-0.54	**-6.08**	**6.13**	2.80	**10.10**	**11.09**	2.21
HRV	**46.34**	**8.77**	-0.83	2.01	**6.87**	**-7.75**	1.73	**-5.72**	4.08	**4.60**	5.85	7.66	-2.45
HUN	**42.14**	**12.13**	0.36	4.07	**3.87**	-3.15	**-5.51**	**-4.69**	1.92	**3.38**	6.45	**8.92**	-1.75
IDN	**27**	**3.56**	-1.78	-0.30	**6.48**	-2.67	-0.55	-1.25	2.08	3.80	12.55	11.34	2.89
IRL	**39.51**	**16.54**	-2.17	3.50	**6.32**	-0.26	-2.20	-4.25	1.19	0.55	**11.96**	0.76	-3.23
ISL	**36.64**	**21.93**	-0.70	-1.82	**6.10**	0.56	-1.30	0.50	**5.77**	-2.81	6.69	**30.09**	-2.40
ISR	**50.02**	**19.58**	1.20	-2.60	2.03	1.37	-0.87	-0.38	**7.28**	4.43	**13.40**	3.47	3.05
ITA	**45.65**	**7.46**	**3.93**	1.33	**8.84**	**-3.89**	-0.22	**-8.04**	**8.86**	2.22	4.29	**8.95**	-1.17
JOR	**38**	**19.10**	-4.10	-7.91	0.00	-5.58	-0.10	-2.23	-0.06	4.50	8.80	0.54	-0.41
JPN	**36.44**	**11.56**	0.35	-1.50	**5.77**	-2.92	**4.11**	**-3.76**	**6.64**	-1.67	3.10	3.01	-1.39
KAZ	**32.72**	**10.40**	-0.40	1.03	**5.92**	**-5.43**	3.01	-3.26	2.45	2.50	**18.26**	5.07	-0.08
KOR	**33.42**	**11.91**	1.71	2.91	**11.05**	**-6.74**	1.80	**-9.37**	**4.83**	**4.68**	-4.62	**22.26**	-0.52
LTU	**48.94**	**12.98**	0.01	-1.17	**7.58**	-2.70	-1.17	**-3.43**	3.20	0.55	3.70	**9.09**	2.31
LUX	**44.35**	**9.49**	2.96	-0.07	**5.03**	**-6.41**	1.54	**-3.50**	3.77	**5.81**	**10.94**	10.94	-0.21
LVA	**41.83**	**16.23**	1.58	0.93	**6.60**	-4.54	**-4.70**	-6.16	**5.48**	2.83	**12.57**	**13.47**	0.34
MAC	**28.84**	**8.26**	1.20	2.44	**8.51**	-5.43	-0.30	-0.81	**4.04**	2.88	4.79	10.41	-0.46
MEX	**30.67**	**8.00**	2.03	-1.45	**3.53**	**-6.38**	0.83	-0.80	**4.02**	**3.22**	3.31	**14.43**	**-2.73**
MNE	**55.24**	**8.26**	2.30	-1.75	3.27	-0.73	-2.68	-0.92	**7.97**	1.37	2.11	7.70	-2.91
MYS	**31.42**	**10.43**	-0.20	-4.89	0.32	-4.16	-2.46	0.45	**4.58**	**8.11**	**12.33**	**16.18**	-0.40
NLD	**29.38**	**16.41**	1.89	0.22	3.77	4.30	-3.68	**-8.52**	-2.52	1.52	-3.24	**17.40**	0.51
NOR	**42.01**	**18.58**	0.18	3.67	1.87	1.63	-2.28	**-5.57**	**5.48**	2.13	11.48	11.77	2.00
NZL	**35.71**	**22.74**	-0.52	-3.56	4.15	2.99	1.31	0.11	**10.35**	3.16	2.50	**17.77**	-4.08
PER	**40**	**8.62**	4.63	**-6.12**	3.73	-3.40	0.91	-4.69	**4.77**	**7.26**	-6.69	**18.02**	-0.79
POL	**40.49**	**13.57**	1.69	0.42	**5.78**	**-4.51**	**-4.08**	-3.05	**4.73**	**4.53**	-0.64	**12.52**	0.92
PRT	**44.42**	**16.72**	0.57	-3.03	**6.12**	**-5.15**	2.55	0.96	**3.25**	0.18	3.90	**18.79**	-0.77
QAT	**34.19**	**8.33**	3.91	-4.62	3.74	-2.39	-1.16	1.10	3.91	1.16	2.37	**16.72**	-2.25
QCN	**19.34**	**14.21**	0.09	**-7.28**	**11.85**	-1.33	-0.66	-1.08	**6.73**	**4.09**	-1.90	**14.21**	0.46
QRS	**35.41**	**13.50**	3.03	1.50	**11.97**	-4.84	**10.15**	-3.62	**7.83**	-5.22	11.15	-2.71	**-11.50**
ROU	**39.8**	**9.08**	2.57	1.65	**4.82**	**-4.28**	-0.02	-2.89	**4.45**	3.52	5.94	**13.60**	2.33
RUS	**28.62**	**6.31**	3.59	-2.32	**8.60**	-4.05	0.96	0.98	**11.37**	-1.23	2.40	0.79	-0.17
SGP	**24**	**17.73**	-0.02	-1.95	**6.54**	-3.27	0.78	-2.31	**5.51**	2.55	1.61	**22.47**	-2.88
SRB	**46.38**	**11.57**	-0.52	0.81	**4.24**	**-5.43**	1.61	**-6.33**	**7.22**	**4.02**	**12.23**	6.35	-3.91
SVK	**36.99**	**16.20**	0.87	-0.11	4.00	-3.15	0.16	**-4.39**	**5.91**	**4.43**	2.37	5.24	2.48
SVN	**50.98**	**15.60**	2.69	2.51	2.49	-3.11	-1.16	-5.88	**4.91**	**7.31**	7.81	8.66	-5.06
SWE	**38.59**	**11.60**	1.84	2.89	3.90	**-5.33**	-2.76	**-8.07**	2.09	**4.00**	0.99	**16.08**	**-4.96**
TAP	**29.74**	**14.34**	-0.02	2.52	**10.42**	**-5.96**	-2.60	-1.08	1.05	1.67	4.66	**15.26**	3.96
THA	**35.55**	**14.36**	-2.36	1.06	**8.74**	**-7.76**	-0.48	-3.37	**9.24**	2.49	**10.45**	**13.51**	0.60
TUN	**42.36**	**6.63**	-1.67	-5.35	2.65	-3.24	0.09	4.83	4.57	0.59	-2.93	12.22	0.39
TUR	**51.14**	**8.21**	3.07	2.47	**5.46**	-4.08	-3.07	**-5.67**	0.13	1.27	**10.15**	3.48	-2.38

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URY	**39.38**	**15.80**	1.23	-2.48	1.66	-4.81	**5.11**	**-4.89**	**5.25**	3.67	-0.12	**16.94**	3.41
USA	**26.84**	**8.91**	0.03	2.83	**7.38**	-3.31	0.27	-2.74	**8.22**	**4.69**	**20.57**	**14.16**	1.18
VNM	**37.47**	**14.09**	-0.73	-2.53	**13.38**	-6.40	-1.43	**-10.64**	**5.69**	5.99	10.02	1.57	-1.34
ALL Average	38.24	12.23	1.00	0.06	5.57	-3.48	-0.49	-3.53	4.63	2.90	5.66	11.90	-0.49
OECD Average	38.93	13.15	1.18	1.07	5.51	-3.05	-0.97	-4.16	4.13	2.74	4.56	12.98	-0.79
Number	62	62	0	2	36	18	9	25	39	24	16	38	4

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Table 7b.

COUNTRY	STUDREL.M	COGACT.M	TCHBEHTD.M	TCHBEHSO.M	TCHBEHFA.M	DISCLIMA.M	MTSUP.M	CLSMAN.M	ESCS.M
ARE	**20.36**	-6.83	-17.44	13.85	-5.64	-18.91	8.29	15.37	8.16
ARG	7.20	15.54	-5.76	-2.66	6.16	6.89	-22.14	-8.57	-8.50
AUS	-4.00	7.66	-1.90	-4.68	-3.88	**12.19**	0.45	**-14.07**	-0.23
BEL	10.62	14.45	-10.45	**13.12**	-7.42	4.02	-5.13	-1.81	-5.09
BGR	6.05	29.48	-21.57	17.48	-25.01	4.73	5.57	-16.74	-16.46
BRA	2.38	**16.80**	-12.67	0.23	-3.77	-5.80	3.20	0.96	0.10
CAN	**11.19**	5.60	3.01	2.27	-13.12	-3.55	-6.12	7.08	-6.51
CHE	0.89	2.16	6.19	1.70	-3.43	7.58	-5.90	-5.27	-3.27
CHL	8.44	4.77	-2.28	1.16	11.78	7.50	-10.23	-6.93	1.96
COL	-12.04	-1.39	-12.70	6.55	11.00	7.52	15.93	-10.27	**-11.27**
CRI	-2.03	5.54	-6.93	1.22	11.13	1.11	-0.06	-5.99	-5.75
CZE	-1.96	7.08	15.39	-4.30	-8.16	**15.01**	-10.08	-8.84	-1.33
DEU	3.48	-0.43	-7.30	7.58	-7.44	7.60	5.41	-5.76	10.42
DNK	-7.79	-2.05	-2.16	-8.39	1.67	0.70	17.11	-1.97	3.18
ESP	6.39	4.46	-12.14	-2.29	4.93	1.75	-0.08	0.33	0.51
EST	-11.08	1.63	-0.37	6.25	-16.69	8.10	10.58	-2.14	-1.85
FIN	**12.27**	-0.43	0.64	5.80	-1.64	7.48	-17.49	0.90	6.51
FRA	3.59	5.27	-10.30	10.38	13.21	13.75	5.47	-3.78	-2.58
GBR	-4.71	1.14	0.95	**13.38**	-10.67	12.90	1.98	-5.46	-4.15
GRC	17.13	15.83	13.22	9.74	-1.93	**-25.14**	**-24.60**	20.18	-2.24
HKG	-6.95	7.33	**50.24**	-9.05	-25.22	-5.70	-23.23	-2.44	-2.24
HRV	12.03	12.68	0.62	-1.94	1.86	-5.11	-3.86	1.75	5.57
HUN	6.66	9.90	-15.89	0.33	-2.91	-6.94	-0.24	3.14	4.53
IDN	7.51	10.52	-25.80	-13.02	24.31	-17.61	-1.38	9.02	-3.88
IRL	7.36	-5.55	-0.50	10.60	-3.88	9.98	7.08	-21.55	-0.21
ISL	-10.55	19.99	7.46	-9.18	-20.19	-5.03	12.16	-6.46	-10.08
ISR	**-25.62**	8.90	10.32	4.61	1.28	17.82	23.51	-19.44	-2.07
ITA	-5.73	11.39	11.76	5.94	-4.22	-4.21	**-14.96**	0.79	-0.28
JOR	**-**	-16.09	-	-	-	7.19	-	-	-
JPN	-5.30	7.78	-2.60	-4.22	11.41	0.60	-7.80	15.85	1.14
KAZ	17.34	11.42	-5.14	2.56	-9.33	-1.31	-3.18	3.24	-21.87
KOR	2.20	-12.42	-9.65	-23.52	31.92	9.53	3.75	8.90	-9.03
LTU	-3.34	12.92	**-20.87**	10.07	-4.49	5.10	-0.55	5.88	2.47
LUX	-26.86	**199.42**	-	**-81.48**	-	-	-	**-70.23**	-33.61
LVA	-13.98	-8.29	-7.28	11.93	-11.64	3.29	18.85	2.62	-5.53
MAC	-5.62	7.76	15.86	-8.37	**-75.56**	-25.61	10.18	**63.94**	-1.72
MEX	-0.34	-6.48	6.63	1.04	0.56	0.46	-3.34	-1.09	1.49
MNE	-14.21	-28.58	-9.65	11.21	28.23	-28.76	-13.06	19.64	-16.78
MYS	-7.90	**39.95**	-25.22	-2.50	-7.84	2.66	-10.98	-14.72	0.48
NLD	9.55	-1.23	8.52	13.48	-3.99	-7.72	-14.14	-5.93	12.65
NOR	6.04	-3.91	-5.41	4.68	-2.88	11.80	2.36	-6.96	-13.28
NZL	-16.81	-4.38	-18.48	-6.13	21.42	-11.47	15.71	20.94	19.42
PER	**-19.25**	10.45	-16.92	14.89	1.71	8.97	-0.69	-2.79	1.33
POL	-11.84	1.45	10.14	4.97	7.83	12.16	-15.39	-7.18	3.33
PRT	9.10	-6.25	0.91	3.45	3.15	**-22.57**	-13.02	20.35	3.48
QAT	-47.02	-64.49	109.82	-167.18	86.90	-40.49	67.31	-50.15	-42.71
QCN	2.14	**23.29**	2.17	-11.46	-10.02	0.22	-0.07	-5.80	-1.51
QRS	9.20	29.67	**-53.46**	-0.41	8.87	14.38	-18.32	4.71	-15.45
ROU	3.64	-21.40	6.29	4.91	16.02	19.49	-2.85	1.84	-9.12
RUS	13.88	4.02	-17.65	**25.41**	-4.41	**20.49**	-12.83	-6.13	**-23.85**
SGP	-11.13	-14.97	8.36	0.32	-15.48	-3.49	**32.42**	-1.13	2.97
SRB	13.64	-5.67	8.44	-6.48	5.34	-4.68	0.99	-4.14	14.57
SVK	-0.57	1.29	10.54	5.54	2.11	3.32	-7.12	-5.75	-3.70
SVN	0.92	2.37	1.94	7.87	-13.48	4.87	1.24	-6.50	**17.68**
SWE	-3.52	-8.78	-2.83	2.43	11.16	3.37	0.26	-3.92	8.29
TAP	19.41	21.55	-14.17	-4.00	-1.35	10.29	-5.63	-7.19	2.69
THA	6.93	-10.31	-5.09	-15.14	19.41	6.86	11.94	-12.38	3.80
TUN	-18.81	-7.18	-20.59	28.76	9.98	-0.79	9.19	14.95	-5.80
TUR	-12.76	9.88	-0.43	-5.42	9.11	21.69	-6.94	-12.22	3.27
URY	12.65	1.94	-6.37	8.93	-11.59	-6.00	2.31	-0.31	-4.29
USA	-12.39	-4.54	13.51	10.87	-9.40	-0.77	11.50	-10.85	8.05
VNM	-7.40	0.28	11.07	-10.45	0.84	23.40	-6.65	-7.78	5.96
ALL Average	-1.01	5.84	-1.23	-1.59	0.28	1.40	0.28	-2.43	-2.33
OECD Average	-1.39	8.67	0.58	-0.07	-0.12	3.34	-1.38	-4.11	0.19
Number	5	4	3	4	1	5	3	3	3

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Table 7c.

Country	SCH01	SCH02	SCH03	SCH04	SCH05	SCH06	SCH07	SCH08	SCH09	SCH10	SCH11
ARE	-3.50	-3.05	**20.72**	**-11.78**	-1.77	-4.57	-3.71	-10.70	**22.25**	3.68	2.25
ARG	0.27	1.22	2.80	1.37	-4.71	-2.66	1.74	10.93	6.33	-1.16	6.34
AUS	-0.67	-0.15	0.33	-2.18	-1.38	1.27	-1.20	**6.83**	-2.16	2.61	-0.11
BEL	-2.95	0.66	0.01	-0.53	**8.83**	-4.01	-	-0.32	1.07	-6.49	3.43
BGR	1.12	-	-	-3.18	7.49	1.20	2.90	0.99	-1.89	2.57	0.21
BRA	-2.54	-1.08	-1.01	-0.88	-1.88	1.63	-7.65	0.72	0.26	2.14	0.39
CAN	-0.83	1.31	**10.56**	-2.04	0.39	-0.67	3.21	2.28	-2.73	0.86	0.33
CHE	**-4.85**	1.87	-4.37	-2.25	-0.91	2.34	10.75	-1.98	-5.56	1.91	1.48
CHL	-2.81	-0.57	-0.79	-1.82	0.25	-1.79	-0.33	-3.67	-2.88	3.34	0.02
COL	0.17	**8.65**	-7.70	-3.31	-6.88	3.40	-0.51	1.54	4.34	-5.64	2.38
CRI	0.00	-2.71	7.58	-0.09	2.04	0.44	-1.90	**12.68**	3.04	3.80	2.87
CZE	0.91	0.30	-5.33	-3.47	-0.87	5.29	-1.26	2.43	-3.16	8.81	3.28
DEU	-2.65	1.78	1.74	-3.94	-0.80	2.07	0.91	1.31	5.25	3.07	-3.78
DNK	**-6.95**	0.39	0.39	-5.23	3.20	1.01	-1.53	-7.36	5.89	-0.04	**-10.04**
ESP	-2.93	3.23	-6.55	0.82	**4.74**	-1.35	5.64	-2.53	-0.06	-1.38	-0.50
EST	-2.15	2.15	3.15	-0.43	-3.09	1.44	**-9.07**	6.97	2.41	-1.32	-0.71
FIN	-2.43	**7.27**	-0.74	0.76	-0.73	4.36	-0.89	1.59	2.05	0.84	2.19
FRA	-2.53	7.43	3.17	-2.13	-3.32	6.97	-1.13	-1.87	-7.20	9.49	5.28
GBR	-1.95	1.13	-0.09	0.06	0.66	-1.32	-3.06	**7.25**	-0.73	0.62	2.45
GRC	-2.91	-0.34	1.83	4.26	3.72	**22.97**	-12.76	3.75	-6.83	5.41	-3.43
HKG	-	-3.80	0.89	-0.40	3.40	-4.26	4.00	-2.23	-0.51	-1.47	-2.24
HRV	0.50	-0.10	0.45	-2.15	-2.03	-4.07	-4.35	-6.01	5.37	-3.06	7.23
HUN	0.07	-0.66	-4.75	1.77	0.20	1.37	-2.18	-5.46	-0.42	5.72	-5.21
IDN	1.57	-6.16	7.45	**-5.74**	1.41	-2.05	-2.06	**-18.87**	8.23	**-14.06**	-4.60
IRL	2.24	1.69	1.10	-1.43	-1.40	-3.80	10.78	3.59	6.26	-6.98	-4.26
ISL	2.57	-0.14	2.14	-4.97	-1.92	-1.07	-6.26	4.09	1.67	-1.17	-3.36
ISR	-5.28	-3.47	2.33	-4.09	-8.38	-4.97	-2.60	-0.97	0.59	-3.82	-4.44
ITA	-0.20	-2.84	4.44	0.41	3.06	-2.05	1.22	2.96	1.31	2.05	-2.07
JOR	3.06	**-14.11**	19.68	-12.53	5.43	-18.20	25.91	-1.60	**-45.40**	-1.40	10.55
JPN	0.87	-1.64	2.55	0.88	-0.76	-1.72	-3.61	-1.63	0.42	2.89	-3.29
KAZ	-1.36	3.81	-3.82	0.79	5.93	0.66	6.63	1.12	-3.12	1.78	3.30
KOR	-0.84	-1.88	-5.60	-0.13	0.28	2.39	-6.78	**17.29**	-4.25	-1.46	-2.67
LTU	-3.80	3.51	-4.53	1.59	1.43	2.61	-0.58	-1.61	-1.22	0.71	-4.42
LUX	-15.13	**-25.94**	**37.71**	-15.42	-10.51	10.97	-10.97	**23.76**	17.03	-43.13	-13.87
LVA	-2.54	-3.45	-2.18	4.38	-1.13	-1.50	5.67	11.41	-3.70	0.83	0.30
MAC	-	**-21.22**	**27.57**	3.87	0.26	-11.72	-11.04	23.52	4.83	-19.08	-1.79
MEX	-2.09	0.00	-0.32	0.93	1.78	-0.94	-3.41	-2.01	0.34	-0.86	-1.29
MNE	1.14	0.76	-	2.99	-6.36	5.99	8.14	5.79	1.23	-6.18	**-10.22**
MYS	-2.01	3.90	-0.03	1.15	-2.86	1.80	13.47	-4.53	-3.15	0.95	-4.18
NLD	-0.16	2.39	-1.66	1.18	-0.10	2.44		3.37	**-19.26**	11.14	-5.80
NOR	-4.08	-3.88	-2.28	-1.46	-2.47	1.13	-5.93	-1.25	2.35	-0.33	-2.20
NZL	0.00	**-11.54**	**10.85**	-0.40	-6.55	**-21.10**	4.05	-1.47	-5.23	-3.00	**9.85**
PER	-1.44	1.82	0.34	-4.01	1.21	-5.51	-7.29	2.42	4.00	5.72	0.79
POL	-0.62	-	-	1.61	-1.77	4.02	19.90	-0.84	3.39	-6.91	-1.31
PRT	-2.50	-1.15	0.86	-5.28	-1.98	1.97	4.21	**7.88**	-0.11	8.25	-2.44
QAT	-13.39	105.32	-	-11.59	-26.43	-2.65	-16.54	-14.97	77.59	-81.06	13.08
QCN	-	-3.49	2.24	-1.16	-0.20	1.99	-4.09	-3.47	2.36	-0.90	-1.58
QRS	0.66	-2.98	2.43	2.79	6.70	-2.20	7.11	-4.49	7.04	5.08	-1.92
ROU	-2.73	-5.17	-7.34	-0.10	4.60	-3.11	-1.76	0.10	-5.39	2.85	-0.91
RUS	-0.15	0.87	-1.53	2.17	-1.45	-2.32	2.14	-4.22	-4.83	2.80	-2.43
SGP	-	3.41	-0.37	5.45	-0.61	0.39	**9.77**	-3.56	5.65	-1.93	2.17
SRB	-2.65	-6.80	-	-4.61	3.54	-2.56	8.67	-9.50	**10.57**	-5.75	2.08
SVK	-4.70	-3.67	**-16.55**	-2.18	2.95	6.28	2.44	-1.78	8.11	**-12.82**	0.31
SVN	-2.12	-7.63	-13.07	0.37	-1.28	0.89	0.60	-6.77	3.03	3.98	-2.03
SWE	-1.03	-0.22	2.49	-1.22	-0.70	5.53	-6.88	-8.19	4.42	4.60	4.63
TAP	-0.37	**9.17**	**-10.19**	0.33	-1.86	2.45	-2.75	-5.72	3.36	-5.09	-0.33
THA	-4.44	-1.65	4.61	1.12	5.98	8.27	13.84	-0.62	0.26	-1.41	-6.09
TUN	-2.79	-3.15	1.78	-4.98	-1.78	-5.39	4.23	-5.62	3.27	0.81	-0.74
TUR	-1.57	-6.78	2.04	-1.76	4.58	-3.78	0.94	8.29	-2.00	0.75	5.08
URY	-2.73	-3.23	0.01	2.91	-6.11	**8.63**	0.19	6.66	-6.89	0.55	-3.04
USA	**-5.26**	-2.97	5.95	3.48	4.75	-3.62	0.56	-9.50	6.25	2.77	-5.28
VNM	-0.36	5.60	-3.56	-2.66	0.79	-6.37	1.47	1.53	2.38	-7.75	0.32
ALL Average	-1.96	0.37	1.54	-1.36	-0.41	-0.12	0.62	0.45	1.70	-2.13	-0.48
OECD Average	-2.29	-1.37	0.99	-1.39	-0.29	0.98	-0.47	1.39	0.28	-0.32	-1.21
Number	3	6	6	1	2	3	2	7	4	2	3

Table 7d.

COUNTRY	SCH12	SCH13	SCH14	SHC15	SCH16	SCH17	SCH18	SCH19	PRESS_STU	PRESS_SCH	PRESS_TEA	R2
ARE	0.09	-13.53	-1.89	1.64	1.23	-3.79	0.01	-11.57	30.63	32.87	**59.56**	0.51
ARG	3.88	0.28	-8.32	-2.50	-1.09	-5.48	-0.04	0.19	11.01	-26.19	-6.75	0.38
AUS	-5.03	3.57	0.76	-1.32	3.74	-1.03	0.00	3.11	3.98	-8.82	-0.25	0.43
BEL	2.91	-0.91	-1.45	2.82	-1.27	-1.65	0.01	1.09	2.44	-5.17	6.16	0.35
BGR	4.40	1.56	-1.30	-3.06	2.28	6.27	0.11	2.94	9.27	13.07	-4.44	0.44
BRA	-1.87	-0.49	3.17	-2.68	-0.98	-2.21	0.02	-12.79	4.93	14.16	-9.39	0.35
CAN	-2.82	-0.06	-1.73	-0.49	0.88	3.97	-0.03	0.87	7.54	-8.44	-1.70	0.32
CHE	-0.58	-0.51	2.35	-1.91	3.58	-3.28	0.05	-3.72	12.98	-7.75	12.39	0.43
CHL	3.51	-5.12	4.06	7.31	-1.44	0.20	-0.06	4.32	6.41	4.26	14.00	0.40
COL	-0.78	-3.48	-0.02	-1.47	-0.65	0.91	-0.05	-	6.15	-12.75	6.48	0.36
CRI	-1.05	-6.18	-2.33	-4.98	-5.49	5.97	-0.02	-3.41	18.87	6.64	-0.74	0.39
CZE	-1.90	-3.34	-2.72	5.21	0.89	6.04	0.01	9.34	-9.11	6.92	-17.47	0.50
DEU	-1.09	1.07	-0.11	-1.20	8.32	-4.21	-0.05	4.91	**-20.77**	15.42	-4.49	0.59
DNK	8.73	5.09	-3.44	-0.85	3.01	-1.06	-0.08	0.39	-14.07	-2.46	10.26	0.50
ESP	4.73	-0.31	1.06	-2.25	-0.73	-0.50	0.01	4.54	1.31	-8.30	-1.71	0.30
EST	2.79	-7.09	5.70	3.68	-5.75	0.43	-0.04	-0.34	11.66	8.06	-6.54	0.50
FIN	-1.26	0.77	-3.61	1.85	-2.22	-3.51	0.03	1.02	-0.43	-13.73	14.92	0.48
FRA	-1.30	1.36	1.35	-1.19	-7.50	-2.13	-0.02	-1.97	14.79	-10.28	-0.95	0.44
GBR	6.47	-6.29	1.41	-0.08	-6.62	1.23	-0.01	1.14	-0.91	-25.72	8.18	0.48
GRC	-0.91	6.70	-1.41	0.05	0.75	-4.41	0.08	-5.22	2.05	11.83	-21.74	0.37
HKG	-9.50	1.55	3.43	-0.61	9.94	1.45	0.05	-8.40	3.62	11.76	-16.99	0.45
HRV	-5.22	-4.92	2.40	0.44	-3.04	1.80	0.03	2.32	-6.90	-9.13	4.87	0.51
HUN	**8.68**	-4.82	3.61	5.26	4.61	-5.34	0.06	4.74	-10.73	12.89	-18.88	0.48
IDN	-4.65	8.28	-10.59	-5.96	**16.46**	4.16	0.06	--	-10.35	-32.61	-23.70	0.25
IRL	6.96	-2.13	7.03	6.99	-6.32	-2.58	0.07	-8.23	-16.04	10.56	-12.51	0.47
ISL	1.42	-6.91	-1.07	8.90	4.22	0.85	-0.08	12.11	1.25	-14.88	5.87	0.49
ISR	4.65	7.23	-2.10	-1.16	6.94	-2.85	0.04	7.04	-3.98	-12.86	-6.41	0.40
ITA	0.66	-1.70	1.43	-0.14	-2.99	1.72	0.02	4.20	0.00	3.58	-11.52	0.41
JOR	25.13	**-28.00**	13.16	**23.34**	2.44	-	-0.01	5.81	-	-	-	0.53
JPN	-4.24	3.89	-1.29	-2.38	-2.48	-2.64	-0.07	6.27	8.73	-18.21	6.58	0.33
KAZ	-3.92	-3.80	2.94	2.65	0.85	1.64	-0.05	-5.75	-16.16	-29.45	-26.17	0.29
KOR	5.93	1.23	8.14	-3.34	-7.65	-5.28	0.01	-1.68	12.54	14.00	-20.96	0.52
LTU	0.48	4.31	-3.36	0.34	2.49	-4.17	0.02		11.12	-3.87	3.97	0.52
LUX	-9.80	-44.70	-34.02	25.58	18.42	27.68	**-1.50**	**-37.49**	-9.64	-46.46	13.65	0.46
LVA	-5.87	5.38	3.23	-2.90	2.38	**10.50**	-0.04	-5.96	9.45	-10.74	14.56	0.46
MAC	4.86	-17.83	-2.22	-5.60	23.84	-7.99	-0.04	-15.81	-44.52	-20.57	-31.76	0.37
MEX	4.02	1.50	-0.09	-0.08	-1.15	-1.07	-0.01	0.90	2.59	-9.55	1.36	0.25
MNE	2.90	-0.59	9.04	-2.65	-7.81	-6.38	-0.07	3.37	**-46.15**	15.27	30.96	0.44
MYS	0.74	1.93	-4.56	2.47	-2.05	-1.25	0.00		0.10	9.26	-15.96	0.36
NLD	1.67	0.29	4.43	-6.06	1.40	-1.72	**0.20**	-0.50	-25.52	17.10	-6.82	0.43
NOR	-6.96	0.24	7.30	1.69	0.06	1.25	0.03	-0.88	-0.53	-0.51	-6.22	0.40
NZL	-0.82	**-12.79**	8.39	-9.09	7.39	-3.89	-0.13		17.91	-26.68	13.07	0.48
PER	-3.72	-2.14	1.00	1.29	-2.40	-3.32	-0.07	-15.03	0.46	-20.98	12.80	0.38
POL	9.89	-0.47	-3.59	-1.75	-4.86	5.29	0.07	1.68	-1.25	-6.18	5.29	0.54
PRT	1.02	-4.10	6.69	3.67	-1.94	2.99	0.04	-4.21	-3.97	6.42	15.70	0.43
QAT	67.83	-34.34	7.95	-8.88	-8.73	-28.66	-0.11	-	4.75	178.30	-104.42	0.31
QCN	0.67	-3.54	4.06	-5.95	3.02	2.66	0.00	8.59	9.13	5.37	9.33	0.45
QRS	-8.47	5.31	13.95	-9.75	1.82	-10.06	-0.17	-	21.57	-42.59	30.04	0.43
ROU	-1.72	4.42	-5.24	-1.46	4.58	-1.17	-0.09	2.34	11.82	3.58	-0.85	0.29
RUS	-1.07	-0.91	-0.59	2.70	2.48	1.15	**-0.19**	-	-3.44	-35.23	30.56	0.34
SGP	**-7.86**	3.53	-4.12	1.74	-1.09	**-5.17**	0.06	-5.76	-2.36	14.73	-10.33	0.35
SRB	-3.08	1.74	-6.99	-0.23	-0.57	2.62	-0.01	-13.86	-12.94	5.66	-1.88	0.40
SVK	0.19	3.28	-1.17	-4.64	-1.20	3.40	0.01	8.05	-9.41	-1.10	0.15	0.45
SVN	-2.02	2.77	2.67	0.49	3.33	0.61	-0.03	-6.98	-11.37	-1.61	10.69	0.55
SWE	-7.50	0.99	-3.81	-0.41	0.83	-2.55	0.00	0.89	-0.34	4.51	-0.61	0.35
TAP	1.18	-0.87	0.19	4.02	3.32	3.54	-0.02	4.12	-23.61	0.39	2.29	0.49
THA	-5.67	-5.03	3.70	3.80	2.67	-8.22	-0.03	18.17	-14.51	12.26	-5.56	0.37
TUN	1.48	-5.22	7.35	3.90	-2.17	-1.86	-0.03	-4.19	-5.71	10.27	-3.73	0.29
TUR	-1.89	-2.24	-1.41	-0.20	7.18	-3.32	0.01	-	-6.69	-8.79	-0.49	0.40
URY	-0.61	-0.13	0.62	6.79	1.51	1.23	-0.02	6.55	-12.10	18.24	-12.90	0.35
USA	-1.35	-0.63	-5.55	0.57	0.65	-2.54	0.02	6.89	-9.42	1.80	**-18.63**	0.45
VNM	1.50	2.29	-3.67	-0.13	1.30	4.99	0.03	-10.67	7.92	0.96	-10.04	0.35
ALL Average	1.21	-2.49	0.30	0.51	1.11	-0.67	-0.03	-0.88	-1.41	-0.19	-1.64	0.42
OECD Average	0.75	-1.94	-0.07	1.08	0.67	0.00	-0.04	0.40	-1.45	-3.64	-0.59	0.44
Number	2	2	0	1	1	2	3	1	1	0	2	

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Table 8. The effect of gender in the basic model and in model 2, 3 and 4, and the difference between them, by country. (Lines in gray represent OECD countries)

COUNTRY	GENDER COEFFICIENT IN BASIC MODEL	GENDER COEFFICIENT IN MODEL 2	GENDER COEFFICIENT IN MODEL 3	GENDER COEFFICIENT IN MODEL 4	DIFFERENCE BETWEEN MODEL3 AND 4	R^2 IN BASIC MODEL	R^2 IN MODEL 2	INCREASE IN EXPLAINED VARIANCE (MODEL2-BASIC MODEL)	R^2 IN MODEL 3	INCREASE IN EXPLAINED VARIANCE (MODEL3-MODEL2)	R^2 IN MODEL 4	INCREASE IN EXPLAINED VARIANCE (MODEL4-MODEL3)
ARE	51.39	46.63	46.92	42.98	3.94	0.25	0.40	0.15	0.41	0.01	0.51	0.09
ARG	51.71	47.38	47.49	46.23	1.25	0.20	0.30	0.11	0.33	0.03	0.38	0.05
AUS	47.19	32.16	32.54	33.90	-1.36	0.23	0.39	0.16	0.40	0.01	0.43	0.03
BEL	39.57	28.41	28.76	27.62	1.14	0.16	0.30	0.15	0.32	0.02	0.35	0.03
BGR	66.09	54.74	52.06	51.91	0.16	0.25	0.39	0.14	0.43	0.04	0.44	0.01
BRA	48.44	41.43	41.20	40.95	0.25	0.21	0.33	0.12	0.34	0.01	0.35	0.01
CAN	45.30	36.29	36.25	35.49	0.76	0.17	0.29	0.12	0.31	0.02	0.32	0.01
CHE	48.13	35.10	35.22	35.00	0.21	0.25	0.39	0.14	0.41	0.01	0.43	0.02
CHL	49.36	41.24	41.30	41.02	0.28	0.24	0.36	0.12	0.37	0.01	0.40	0.03
COL	44.13	39.40	39.21	39.46	-0.25	0.19	0.31	0.12	0.33	0.02	0.36	0.03
CRI	49.03	45.19	44.56	43.64	0.92	0.23	0.33	0.11	0.35	0.02	0.39	0.03
CZE	49.26	41.12	41.34	40.80	0.54	0.22	0.40	0.18	0.41	0.01	0.50	0.08
DEU	57.70	46.44	47.05	46.33	0.72	0.37	0.55	0.18	0.56	0.01	0.59	0.03
DNK	44.21	32.70	32.30	32.82	-0.53	0.22	0.45	0.23	0.45	0.01	0.50	0.05
ESP	44.96	35.31	35.16	35.15	0.02	0.18	0.28	0.10	0.28	0.01	0.30	0.02
EST	48.87	41.13	41.30	40.53	0.77	0.27	0.45	0.18	0.46	0.01	0.50	0.04
FIN	58.94	46.72	46.67	47.73	-1.06	0.29	0.44	0.15	0.45	0.01	0.48	0.03
FRA	50.13	39.26	37.22	38.18	-0.96	0.21	0.38	0.17	0.40	0.02	0.44	0.04
GBR	36.79	27.63	27.35	28.67	-1.32	0.18	0.44	0.26	0.46	0.02	0.48	0.02
GRC	58.58	47.04	43.88	45.89	-2.01	0.20	0.31	0.11	0.34	0.03	0.37	0.04
HKG	39.58	28.08	28.77	29.34	-0.56	0.17	0.41	0.25	0.43	0.01	0.45	0.02
HRV	56.75	47.77	46.73	46.34	0.39	0.32	0.46	0.14	0.48	0.01	0.51	0.04
HUN	49.50	43.72	44.00	42.14	1.86	0.26	0.42	0.16	0.45	0.02	0.48	0.04
IDN	34.02	29.42	28.62	27.00	1.61	0.11	0.15	0.04	0.16	0.01	0.25	0.08

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IRL	48.00	39.94	40.06	39.51	0.54	0.28	0.41	0.13	0.42	0.01	0.47	0.06
ISL	45.36	36.55	36.79	36.64	0.15	0.19	0.43	0.23	0.45	0.02	0.49	0.05
ISR	57.11	46.85	47.04	50.02	-2.98	0.20	0.32	0.12	0.34	0.02	0.40	0.05
ITA	56.59	46.68	45.88	45.65	0.23	0.25	0.37	0.12	0.38	0.01	0.41	0.03
JOR	62.16	40.17	34.85	-	-	0.27	0.35	0.08	0.42	0.07	0.53	0.10
JPN	42.15	36.76	36.65	36.44	0.22	0.18	0.30	0.12	0.31	0.01	0.33	0.02
KAZ	37.45	32.89	32.82	32.72	0.11	0.11	0.19	0.08	0.24	0.04	0.29	0.05
KOR	41.37	32.64	33.96	33.42	0.54	0.18	0.47	0.29	0.49	0.02	0.52	0.03
LTU	55.45	48.48	48.68	48.94	-0.27	0.32	0.46	0.14	0.47	0.01	0.52	0.04
LUX	55.04	45.08	44.23	44.35	-0.12	0.24	0.40	0.17	0.41	0.01	0.46	0.05
LVA	50.45	41.84	42.13	41.83	0.31	0.25	0.40	0.15	0.42	0.01	0.46	0.04
MAC	39.52	27.91	28.83	28.84	-0.02	0.14	0.31	0.17	0.34	0.03	0.37	0.03
MEX	37.67	30.27	30.20	30.67	-0.48	0.14	0.24	0.09	0.24	0.00	0.25	0.01
MNE	62.16	55.85	55.37	55.24	0.13	0.30	0.41	0.11	0.42	0.01	0.44	0.02
MYS	33.27	29.59	30.26	31.42	-1.16	0.10	0.24	0.14	0.33	0.09	0.36	0.03
NLD	38.11	30.06	30.14	29.38	0.77	0.17	0.33	0.16	0.34	0.01	0.43	0.09
NOR	48.46	43.08	42.85	42.01	0.84	0.19	0.37	0.18	0.38	0.01	0.40	0.02
NZL	47.70	35.98	36.53	35.71	0.82	0.19	0.39	0.20	0.41	0.01	0.48	0.07
PER	39.67	39.25	39.71	40.00	-0.29	0.15	0.31	0.17	0.33	0.01	0.38	0.05
POL	46.35	41.99	41.69	40.49	1.20	0.20	0.48	0.28	0.50	0.02	0.54	0.04
PRT	50.13	44.62	44.30	44.42	-0.12	0.22	0.39	0.17	0.40	0.01	0.43	0.03
QAT	41.20	37.80	37.95	34.19	3.76	0.13	0.20	0.07	0.23	0.02	0.31	0.09
QCN	29.08	17.90	19.31	19.34	-0.03	0.10	0.39	0.29	0.42	0.03	0.45	0.03
QRS	44.72	40.14	38.62	35.41	3.21	0.14	0.31	0.17	0.35	0.04	0.43	0.08
ROU	43.69	40.98	40.36	39.80	0.56	0.14	0.23	0.09	0.26	0.03	0.29	0.03
RUS	38.57	30.25	29.08	28.62	0.46	0.11	0.24	0.13	0.29	0.05	0.34	0.05
SGP	27.61	23.31	23.50	24.00	-0.50	0.09	0.31	0.22	0.32	0.01	0.35	0.03
SRB	55.11	45.64	47.06	46.38	0.68	0.25	0.36	0.11	0.37	0.01	0.40	0.03
SVK	49.37	39.44	38.85	36.99	1.86	0.19	0.41	0.22	0.42	0.01	0.45	0.03
SVN	55.58	49.17	50.50	50.98	-0.49	0.27	0.50	0.23	0.52	0.03	0.55	0.03
SWE	48.64	40.39	39.90	38.59	1.30	0.19	0.32	0.13	0.33	0.01	0.35	0.02
TAP	37.98	30.98	31.56	29.74	1.82	0.13	0.46	0.33	0.48	0.02	0.49	0.02

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THA	43.08	36.66	36.04	35.55	0.49	0.16	0.30	0.14	0.31	0.01	0.37	0.06
TUN	45.77	41.18	40.90	42.36	-1.46	0.14	0.22	0.07	0.23	0.01	0.29	0.07
TUR	50.94	48.18	49.55	51.14	-1.59	0.21	0.33	0.12	0.36	0.03	0.40	0.04
URY	46.63	41.82	41.48	39.38	2.10	0.16	0.29	0.13	0.31	0.02	0.35	0.04
USA	35.31	26.01	25.55	26.84	-1.29	0.17	0.37	0.20	0.40	0.03	0.45	0.05
VNM	40.70	34.69	36.91	37.47	-0.56	0.15	0.32	0.16	0.34	0.02	0.35	0.02
ALL average	46.74	38.68	38.42	38.28	0.14	0.20	0.36	0.16	0.38	0.02	0.42	0.04
OECD average	47.95	39.03	38.94	38.93	0.01	0.22	0.38	0.17	0.40	0.01	0.44	0.04

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APPENDIX 2

Why a correlation between the gender gaps in maths and reading exists?

Historically, a steady remarkable correlation between students' scores in verbal proficiencies (reading) and in maths is reported in the educational and psychometric literature. Usually, the correlation ranges between 0.40 and 0.86 (Aiken, 1971, 1972; Chen, 2010; Secada, 1992). For example, in PISA the typical correlation between reading and mathematics literacy is about 0.85 (OECD, 2012). It is about 0.60 in the Israeli large scale school tests (Rapp 2015). Möller et al. (2009) meta-analysed 69 studies comprising more than 125,000 participants and reported a positive correlation of 0.67, on average. Why does such a high correlation between the achievement level in reading and maths exist? This could be explained through several processes:

- Reading or language skills are recognized as the basis for learning of all academic subjects at school (see for example Estyn, 2008). As such, low language skills can limit one's capacity to learn (and to be assessed in) other subjects at school including in maths (see for example Kieffer et al., 2009; Mullis et al., 2013; Sato et al., 2010). On the other hand, high language skills facilitate and promote studying and achievement in other subjects including maths. Although there are few theorists (e.g. Sfard, 2012) who argue for an inverse direction, it is generally accepted that literacy skills lead to better mathematic skills.
- Another set of factors that influences overall academic performance in the same direction is the student's general intelligence and her general level of "schooling". Here schooling is used to mean motivational, behavioural and emotional aspects one has toward school and activities of learning such as doing homework, preparing for tests and making effort during tests. In addition, since schools are the environment in which most of the learning process takes place, school characteristics probably also impact student's academic performance in various school subjects, including maths and reading, in the same direction.
- The high correlation between reading and maths scores could also be a consequence of the shortcomings of the assessment tools used and the measurement process. That is to say, the assessment tools used to measure knowledge and educational outcome. Tests are not a perfect unidimensional tool of measurement and to a certain degree, they lack discriminant validity (Abedi & Lord, 2001; AERA, 1999,). In psychometric terms, any given test measures also something different than the construct it intends to measure (Haladyna, & Downing, 2004). For example, a computerized test in science also measures some ICT capacities and the ability of students to use computers. For obvious reasons, given that most tests employ language, they inevitably measure some language skills as well. This is especially true in the mathematics literacy PISA test, which is relatively language loaded. The construct has been defined, in part, as the capacity to solve problems in real world situations and includes an important stage of understanding and employing language in each task.
- The co-variation between the achievement or scores in language and maths could result from the fact that both domains are measured in the same test and in similar testing conditions. Thus, a similar level of motivation and effort put forward by the student in a test is expected regardless of the specific domains tested. In low-stakes tests such as PISA, it is even more likely that students invest a similar level of effort in the various subjects of the tests since the motivation to succeed in the test is apparently similar for all of the test domains.