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Supplementary material for:

The cognitive competences of immigrant and native students across the world: An analysis of gaps, possible causes and impact

Method and further result tables (S1 to S6)

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The cognitive competences of immigrant and native students across the world

A note on terminology: We use “competence” and “competences”. Cognitive competence consists of the ability to think (intelligence), knowledge (true and important contents organised in a structured net) and the intelligent (correct, understanding, reasonable) use of knowledge. Knowledge is domain-specific (e.g., knowledge in science vs. mathematics). The terms “competence” and “ability” are interchangeably used.

1 Method

Publically available data documented in reports at the country level were used.

1.1 Cognitive competence measures and percentages

1.1.1 Data

First within each approach, study, survey year and grade the different scales (if available, e.g., reading and mathematics) were arithmetically averaged.

PISA (Programme for International Student Assessment) measures competences (general literacy, not depending on curriculum) in reading, mathematics and science (2003 and 2012 also problem solving) of 15-year-old students (youth at school). The surveys are repeated every three years (2000ff.). The survey is organised by the OECD (Organisation for Economic Co-operation and Development).

PISA 2000 reports results for native students (born in country of assessment with at least one parent born in the same country), first-generation immigrant students (students who were born in the country of assessment but whose parents were foreign-born), and non-native students (students who were foreign-born and whose parents were also foreign-born) in reading, mathematics and science for N_C=27 to 41 countries (OECD, 2003, Table 6.8, pp. 351f.). More achievement results are given for natives (N_C=41) than for immigrants (depending on scale N_C=27 to 31). But for all countries the percentages of natives and immigrants are reported.

PISA 2003 reports results for native students, first-generation immigrant students (students who were born in the country of assessment but whose parents were foreign-born), and non-native students (students who were foreign-born and whose parents were also foreign-born) in problem solving for N_C=21 to 40 countries (OECD, 2004b; Table 5.6, p. 153). Results from more countries are given for natives' achievement than for immigrant's achievement; for all countries the percentages of natives and immigrants are presented.

Between the 2003 and 2006 PISA surveys the definition of first-generation and non-native students was changed: What was before labelled as "first-generation" is now labelled as "second-generation", and what was before "non-native students" is now "first-generation". For general native-immigrant-comparisons this is not important, but for the acculturation hypothesis the finer distinction is crucial. Before combining the PISA studies the older within immigrant categorization (2000, 2003) was adapted to the newer one.

PISA 2006 reports results for native students, first-generation immigrant students (born in another country and whose parents were born in another country), and second-generation students (born in the country of assessment but whose parents were born in another country) in reading, mathematics and science for N_C=25 to 57 countries (OECD, 2007, Table 4.2c,d,e, pp. 114, 116, 117). More achievement results are given for natives, but for nearly all countries the percentages of natives (N_C=56) and immigrants (N_C=55).

PISA 2009 reports results for native students, first-generation immigrant students (those who were born outside the country of assessment and who also have foreign-born parents), and second-generation students (students who were born in the country of assessment but whose parents are foreign-born) in reading for N_C=49 to 65 countries (OECD, 2010b, Table II.4.1, p. 170). More achievement results are given for natives, but for all countries the percentages of natives and immigrants.

PISA 2012 reports results for native students, first-generation immigrant students (those who were born outside the country of assessment and who also have foreign-born parents), and second-generation students (students who were born in the country of assessment but whose parents are foreign-born) in mathematics for N_C=44 to 64

countries (OECD, 2013a, Table II.3.6a, p. 236). More achievement results are given for natives, but for all countries the percentages of natives and immigrants.

TIMSS (Trends in International Mathematics and Science Study) measures competences in mathematics and science of (usually) fourth- and eighth-graders, sometimes also of twelfth-graders and in some countries, depending on school starting age, of third- and seventh-graders (youth at school). The development of scales was orientated on core aspects of curricula in different countries (with stronger impact of developed countries). The surveys are repeated every four years (1995ff.). In each wave more countries participate. The survey is organised by the IEA (International Association for the Evaluation of Educational Achievement).

TIMSS 1995 reports results for native students (both parents born in country), half-and-half immigrant students (one parent born in country) and immigrant students (neither parent born in country) in mathematics and science for fourth graders in N_C=18 to 25 countries (Mullis et al., 1997, Table 4.4, p. 119, Martin et al., 1997, Table 4.4, p. 104). For the eighth grade no results related to immigration status were reported.

For *TIMSS 1999*, *TIMSS 2003* and *TIMSS 2011* no results related to immigration status were reported.

TIMSS 2007 reports results for native students (both parents born in country), half-and-half immigrant students (one parent born in country) and immigrant students (neither parent born in country) in mathematics and science for fourth and eighth graders in N_{C4}=39 to 41 resp. N_{C8}=37 to 52 countries (Mullis et al., 2008, Exhibit 4.3, pp. 152f., Martin et al., 2008, Exhibit 4.3, pp. 146f.).

PIRLS (Progress in International Reading Literacy Study) measures competence in reading of (usually) fourth-graders, in some countries, depending on school starting age, of third-graders (youth at school). The surveys are repeated every five years (2001ff.). In each wave more countries participate. The survey is organised by the IEA. TIMSS and PIRLS use the same system of categorisation of natives and immigrants, but the labels are slightly different.

PIRLS 2001 reports results for native students (father and mother born in country), half-and-half immigrant students (father or mother born in country) and immigrant students (neither parent born in country) in reading for fourth graders in N_C=28 to 35 countries (Mullis et al., 2003, Exhibit 4.5, p. 103).

PIRLS 2006 reports results for native students (father and mother born in country), half-and-half immigrant students (father or mother born in country) and immigrant students (neither parent born in country) in reading for fourth graders in N_C=38 to 45 countries (Mullis et al., 2007, Exhibit 3.12, p. 136).

For *PIRLS 2011* no results related to immigration status were reported.

PIAAC (Programme for the International Assessment of Adult Competencies; OECD, 2013c) measures competences in reading, mathematics and problem solving of adults between 16 and 65 years old. Results are given from 2012. Because PIAAC is a study on adults data are not combined with the student assessment studies. National means on problem solving were not published. Complete data were given only for 21 to 24 countries. We used means, 05%- and 95%-results in reading and mathematics (OECD, 2013c, pp. 261, 266), the age difference between youngest and oldest adults (p. 271), native and immigrant proportions (p. 438). Competence means for natives and immigrants were not reported. Competence gaps were only reported for reading (p. 271). This difference, the country mean and the native and immigrant percentages were used to estimate the means for natives and immigrants. Analyses are kept separately.

1.1.2 Single corrections

The *Kazakhstan* 2007 TIMSS fourth grade results differ widely from those of countries with similar cultural, ethnic, and economic backgrounds (e.g., Armenia, Iran, Ukraine) and from the Kazakhstan PISA 2009 results (for natives TIMSS 2007 mean *SAS*=542 vs. PISA 2009 reading *SAS*=390, a difference of 152 SAS points, equal to *d*=1.52 or 22.80 IQ). Because of these divergences, only the PISA 2009 and 2012 data were used for Kazakhstan.

China has not participated in a recent student assessment study. In PISA 2009 and 2012 only results for the province of Shanghai were reported (not for other provinces and entire China). Due to selective within-country migration, exclusion of within China migrants, local economic success, prosperity, and general development status, the Shanghai PISA results seem to be positively biased compared to all of China.[1] To correct this bias, we used the results presented at the Anatoly Karlin webpage to correct them for China, on average -57 SAS equivalent -8.55 IQ (Karlin, 2012). According to

an Internet based survey with self selected participants the difference is with 3 IQ smaller (equivalent 20 SAS; Lynn & Cheng, 2013). The self-selection may have a positive bias effect.

Dubai was used as indicator of the *United Arab Emirates* (if not presented for entire UAE, no correction), England and Scotland together (or if given with Wales and Northern Ireland) for *United Kingdom* (if not presented for entire UK).

In *Peru* first generation immigrants achieved in reading *SAS*=328 and in mathematics *SAS*=332, but in science *SAS*=113 (PISA 2000; OECD, 2003, p. 351, Table 6.8). This result is highly implausible, according to a notice from the PISA-OECD group (Maciej Jakubowski, 12. October 2011) this result, based on only one student, is mistakenly reported. We assumed a similar result as in reading and mathematics, but slightly lower (*SAS*=311).

For Albania PISA 2012 reports 0% non-immigrants and immigrants (OECD, 2013a, Table II.3.6a, p. 236). For this mistake data were set as missing.

1.1.3 Transformations and aggregation

Within each study the achievement results of different scales were averaged. The values of different migrant groups (first and second generation, full and half immigrants) were averaged considering their percentages. Within each study using the natives' and immigrants' results and their percentages a general country mean was calculated (the reported country mean was not used here, reason see below). Next, differences were calculated, a) differences between natives' and immigrants' means, b) between natives' and (the here calculated) countries' means, and c) between immigrants' and countries' means.

After that, within *PISA* the differences were aggregated across different survey years. Because general means and standard deviations vary with survey year and differences can depend on historical processes, the three native-mean-immigrant differences were standardised oriented to the newest and larger sample of PISA 2012. Newer data were stronger weighted (PISA 2000, PISA 2003 and PISA 2006 together weight 1, PISA 2009 and PISA 2012 together weight 2; PISA 2009 and 2012 were three times more

[1] http://en.wikipedia.org/wiki/Shanghai (9. July 2012), e.g.: "Shanghai has one of the best education systems in China." "Shanghai is the commercial and financial center of mainland China." Exclusion of within China migrants: Friedman (2012) and Loveless (2013).

important than the surveys 2000, 203 and 2006). Mean correlation between the differences of four measurement points is r=.87 (Cronbach-α=.97).

In *TIMSS* the differences were first aggregated within a survey year (in TIMSS 2007 grade 4 and 8; r=.92 (Cronbach-α=.96) using for standardisation their general mean and standard deviation, then for TIMSS 1995 and 2007 standardised oriented to the newer, larger and two grades containing sample of TIMSS 2007 (TIMSS 1995 weighted with 1, TIMSS 2007 with 4; r=.81, Cronbach-α=.87).

In *PIRLS* the differences were aggregated for PIRLS 2001 and 2006 standardised oriented to the newer and larger sample of PIRLS 2006 (PIRLS 2001 weighted with 1, PIRLS 2006 with 2; r=.79, Cronbach-α=.88).

In the next step the two IEA-approaches, TIMSS and PIRLS with their identical migration definition, were combined, using for standardisation their general mean and standard deviation (with same weight, the TIMSS-sample is larger, but comprises also older data from 1995; r=.85, Cronbach-α=.92).

Finally, the data from PISA (N_C=70) and TIMSS-PIRLS (N_C=66) were combined, using for standardisation their general mean and standard deviation (PISA double weight, newer data, more surveys; r=.87, Cronbach-α=.93). The means for the three differences are given for N_C=93 countries. The procedure is similar to the one used by Rindermann, Sailer and Thompson (2009).

1.1.4 Anomalies in data and corrections

In all studies and for nearly all countries the competences of natives and immigrants multiplied with their percentages did not result in the exact country mean. Two examples:

- *USA* in PISA 2009: According to OECD (2010a, Table I.a, p. 15) the mean result for the USA in reading is *SAS*=500. Using the published data for natives and the two immigrant groups the mean has to be *SAS*=501 (*SAS*=501.16; calculation: $Read_{Natives}\times Share_{Natives}+Read_{Migr1}\times Share_{Migr1}+Read_{Migr2}\times Share_{Migr2}$; here, OECD, 2010b, Table II.4.1, p. 170: 506×.805+485×.064+483×.130)[2].
- *Australia* in TIMSS 2007, eighth grade in mathematics: According to Mullis et al. (2008, Exhibit 1.1, p. 35) the mean result for Australia in mathematics of the eighth

[2] Of course, all numbers were double checked. Proportion means: Percentage of students (natives, immigrant groups) in a scale between 0 and 1.

graders is *SAS*=496. Using the published data for natives and the two immigrant groups the mean has to be *SAS*=498 (*SAS*=497.50; calculation: $Math_{Natives}\times Share_{Natives}+Math_{Migr1}\times Share_{Migr1}+Math_{Migr2}\times Share_{Migr2}$; here, Mullis et al., 2008, Exhibit 4.3, p. 153: 496×.61+498×.21+502×.18).

Both examples are typical: The deviations are not large, but in positive direction, the calculated country mean results based on the reported three subgroups are higher than the reported country mean results. If the pattern would not be so robust and frequent, round-off errors could be responsible for such deviations.

But there are also logically absurd results as for PISA 2009 (OECD 2010a, Vol. I, p. 197, OECD 2010b, Vol. II, p. 170):

- *Azerbaijan* in reading: Natives achieved *SAS*=363, immigrants *SAS*=365, but the country mean is not in-between, but lower with *SAS*=362.
- Similarly for *Trinidad and Tobago*: Natives *SAS*=422, immigrants *SAS*=424, country mean is *SAS*=416.

Finally for anomalies, it is possible for countries, for which no immigrant results are reported, to calculate from the reported country mean, natives' mean, and proportions of natives and migrants, the migrants' mean (PISA 2009; OECD 2010a, Vol. I, p. 197, OECD 2010b, Vol. II, p. 170):

- For *Taiwan*, the country mean is *SAS*=495, the natives' mean *SAS*=497 with a percentage of 99.6%, the percentage of the two migrant groups is 0.4%. Using these data the calculated migrant mean has to be *SAS*=-3!
- For *Bulgaria* we even have a calculated migrant mean of *SAS*=-367 (≈ -55 IQ)!

These are all mathematically and psychologically impossible results. In all these cases there have to be an undocumented and for readers unknown low-achieving group with a more than 0% proportion being inconsistent with the reported percentages. According to an email (from Maciej Jakubowski, OECD-PISA analyst, 29. November 2011) that is true: There is a *missing value group*, the group of students not giving information on their parents' origin. The lower level of reported country means (lower than country means estimated by using natives' and immigrants' means and proportions) implies that the missing value group has achieved a lower level than natives' achievement (and maybe also lower than immigrants' achievement). Probably they consist of natives and

immigrants with a higher proportion of immigrants in countries where they have comparatively lower competences.

But these anomalies make the given OECD and IEA data, the native and immigrant competence and percentage estimates, mathematically contradictory and at least slightly invalid. Therefore the differences were step by step corrected for (first) percentages and (second) means leading at the end to mathematically correct and (as we assume) empirically more veridical results (N_C=93).

1.1.5 Estimations for countries without information on immigrants (but for natives)

For seven countries only competences and percentages of natives were presented: China (Shanghai), Japan, Korea (South), Malaysia, Rumania, Uruguay and Vietnam. For these countries the migrants' competence values were estimated by using the means of country and natives and the natives' and (reported or indirectly calculated) migrants' proportions. Resulting are data for N_C=93 countries.

For the following countries country means were reported, but neither natives' nor migrants' values: India, Mauritius, Mongolia, Philippines, and Venezuela. Here no values could be estimated, the countries were excluded.

1.1.6 Final natives' and migrants' estimates

At the end the natives' and migrants' grand means (across different approaches, studies, years, grades and scales) were calculated by using the calculated differences from the studies' calculated mean. These differences were subtracted from or added to the general country mean in student assessment studies. As quality indicator the number of studies giving information for migrants' competence levels (maximum 10) and giving information on migrant status' percentages (maximum 10) were counted. Results are presented in the *SAS*-scale (*M*=500, *SD*=100) and also in the more conventional *IQ*-scale (UK-natives mean set at 100, *SD*=15, "Greenwich IQ" see Table 2). Student assessment tests do exaggerate international differences in cognitive competences compared to more school-distant, knowledge reduced, figural psychometric IQ tests as the Ravens or the CFT (Lynn & Vanhanen, 2012).

An immigration gain (gains or losses through immigration for the country competence mean) was calculated by subtracting the country competence mean from the native's mean. These numbers depend on natives' and migrants' competence levels and their proportions (the larger the differences between the competence levels and the

larger the immigrant proportions the larger the effects). In countries with a longer history of immigration, immigration gains could be underestimated because "nativized migrants" do no longer count as migrants, but as natives.

Results for N_C=93 countries are presented in Tables 1 and 2.

1.1.7 10 year development of natives' and migrants' proportions

The development of student proportions with native or immigrant background could be calculated by comparisons of different survey years within one study approach: Within *PISA* (always 15 year old students) ten paired comparisons are possible: Between PISA 2000 and 2003, PISA 2000 and 2006, PISA 2000 and 2009, PISA 2000 and 2012, PISA 2003 and 2006, PISA 2003 and 2009, PISA 2003 and 2012, PISA 2006 and 2009, PISA 2006 and 2012 and PISA 2009 and 2012. Within *TIMSS* two comparisons are possible: Similar as to PISA one longitudinal, fourth-graders 1995 and 2007, and within 2007 eighth-graders and fourth-graders (the 2007 eighth-graders were 2003 the fourth-graders). Within *PIRLS* the 2001 and 2006 surveys were compared.

All comparisons were transformed to a 10 years interval (e.g., the five year interval result of PIRLS 2001 and 2006 was multiplied with 2, the twelve year interval result of TIMSS 1995 and 2007 was multiplied with 0.83 [divided by 12 and multiplied with 10]). The results were then aggregated within PISA (using for standardisation their general mean and standard deviation, Cronbach-α=.90), within TIMSS (Cronbach-α=.48), within IEA (TIMSS and PIRLS; Cronbach-α=.43) and finally averaged to a general mean (using for standardisation their general mean and standard deviation, mean r=.17, Cronbach-α=.30) standing for a 10 year development of natives' and migrants' proportions. The correlations between the OECD- and IEA-approaches are remarkable low, probably due to their different definitions of migrant status, but there is no hint that one measure is more correct than the other. Generally, IEA shows for the same countries a stronger immigrant increase than OECD. Countries, which participated only once in every survey (PISA, TIMSS, PIRLS) have no 10 year development data. An increment of "3%" means e.g., for Brazil that the proportion of migrants among students from 1999 to 2009 rose from 1% to 4%.

One example: El Salvador participated only in TIMSS 2007 4th and 8th grade with 22% and 6% migrants in TIMSS' categorisation. After our transformations and

combination this corresponds to a 10.88% migrant proportion. But we report here an increase of 19% higher then the given 10.88% migrant proportion, how could this be?

1. The difference between 8th and 4th grade was calculated and projected for a ten year interval (+40%).
2. The results of TIMSS comparisons (4th grade 1995 and 2007, 2007 4th and 8th grade), of TIMSS and PIRLS comparisons and of IEA (TIMSS and PIRLS) and OECD (PISA) comparisons were transformed and aggregated.

Based on one single comparison and large changes a larger 10 year increase than even given migrant proportions is possible. For El Salvador we have the minimum amount of data for calculating the difference – the result will be less reliable.

If preferring a more narrow native and a wider migrant definition, the here presented proportion development indicator would underestimate the proportions of migrants, because third generation migrants (grandparents immigrated) are categorised as natives (e.g., Nyborg, 2012). Certain immigrant groups, e.g., many people from Turkey in Germany, still show as third generation immigrants remarkably different life styles, e.g., in language spoken at home, in within group marriages, educational achievement, religiosity, women's clothing etc. Data are given for N=72 countries.

1.2 Attributes of educational systems and schools and their students

Attributes of educational systems, schools, and students were presented in the 2009 "Educational policy" paper by Rindermann and Ceci (2009). Except for central exams the data were updated using newer information from TIMSS 2007 and 2011, PIRLS 2011, PISA 2009 and 2012. Generally, they were now also more systematically integrated. Data are documented in Table S6.

Age of enrolment at school (typical entry age and actual entry age). Source PISA: PISA-study 2000 (OECD, 2003, p. 270, total N_C=42), PISA-study 2003 (OECD, 2004a, N_C=30), PISA-study 2009 (OECD, 2010c, p. 63, N_C=65), PISA-study 2012 (OECD, 2013b, p. 74, N_C=64), averaged oriented to 2012 results (Cronbach-α=.90). Unfortunately the data are not exact (e. g. would be exact "6;3", six years and three month), but rather are integer and may not be indicative of the actual ages of the children, but only the official guideline of the school authorities ("typical entry age", OECD, 2003, p. 270). Therefore the possible effects of enrolment age are underestimated. Source TIMSS: TIMSS 1995 (Baumert & Lehmann, 1997, p. 182,

N_C=37), TIMSS 2003 (Mullis et al., 2004, pp. 20-24, N_C=46), TIMSS 2007 (Mullis et al., 2008, pp. 378-380, N_C=59), averaged oriented to 2007 results (Cronbach-α=.87). Source PIRLS: PIRLS 2001 (Mullis et al., 2003, p. 131, N_C=29) and PIRLS 2006 (Mullis et al., 2007, p. 163, N_C=38), averaged oriented to 2006 results (Cronbach-α=.98). PIRLS give empirical and more precise results on school entry age. IEA-studies were first combined (TIMSS- and PIRLS-means, averaged oriented to more empirical PIRLS results, TIMSS was more official school entry age; Cronbach-α=.78). Then OECD and IEA studies (PISA with TIMSS-PIRLS, averaged oriented to the more countries covering IEA results; Cronbach-α=.91). For countries not having data in this variable we added information from the source IAEP-II 1991 (Lapointe et al., 1992, p. 20). This was only Mozambique, not participating in our study (no information on natives and migrants). The correlations among different sources are for an identical characteristic too low (effects may be underestimated). In the statistical analysis the school entry age was reversed; a high numerical value corresponds to young age. Finally we have data for N_C=96 countries, here in the used 93-country data set with information on natives and migrants N_C=93.

Repetition rates. Among the student assessment studies only PISA gives information (no information found in TIMSS and PIRLS reports): Proportion of repeaters among 15-year-olds in primary and secondary schools summed up, PISA 2003 (OECD, 2004a, p. 262, N_C=30); PISA 2006 (proportion of repeaters in participating schools, lower secondary education and upper secondary education summed up; OECD, 2007, p. 162, N_C=55), PISA 2009 (OECD, 2010c, p. 63, N_C=65), PISA 2012 (OECD, 2013b, p. 74, N_C=64), averaged oriented to the 2012 results (Cronbach-α=.97). This aggregated score is given for N_C=68 countries.

Attendance of high grades at a young age: Source PISA, age-oriented study: Mean grade of 15 years old students in PISA 2000 (Baumert et al., 2001, p. 413, N_C=32), in PISA 2009 (OECD, 2010a, p. 180, N_C=65) and in PISA 2012 (OECD, 2013b, p. 218, N_C=65), averaged oriented to 2012 results (Cronbach-α=.96). Source grade-oriented TIMSS: TIMSS 1995, country's deviation from mean age in grade 4 and 8 (Martin et al., 1999, p. 11, N_4=25 and N_8=39), the same for TIMSS 1999 grade 8 (Mullis et al., 2000, p. 11, N_8=38), TIMSS 2003 grade 4 and 8 (Mullis et al., 2004, pp. 20-24, N_4=25 and N_8=46), TIMSS 2007 grade 4 and 8 (Mullis et al., 2008, pp. 34f., 379, N_4=37 and

N_8=50), TIMSS 2011 grade 4 and 8 (Mullis et al., 2012a, pp. 430-434, N_4=56 and N_8=48), averaged oriented to 2011 results (Cronbach-α=.84). Source grade-oriented PIRLS: PIRLS 2001, country's deviation from mean age in grade 4 (Mullis et al., 2003, p. 26, N_C=34), PIRLS 2006 (Mullis et al., 2007, p. 37, N_C=39), PIRLS 2011 (Mullis et al., 2012b, p. 262-265, N_C=48), averaged oriented to 2011 results (Cronbach-α=.96). IEA-studies were combined (TIMSS and PIRLS, Cronbach-α=.90). For countries without data (Nigeria, Zimbabwe, Venezuela) results from IEA-Reading (Elley, 1992) were added. Finally OECD- and IEA-data were combined (Cronbach-α=.79). We have data for N_C=100 countries, here in the used 93-country data set with information on natives and migrants N_C=93. Countries with a high value in this variable have an "age-efficient" school system and "time-efficient" students.

Discipline and regularity, school-appropriate behaviour of students. Source PISA: PISA 2000: Not skipping class in the last two weeks, not arriving late for school in the last two weeks, both students' self-report (OECD, 2003, pp. 290, 291, α=.49, N_C=41). PISA 2003: Percentage of students in schools where the principals report that the following hinders students' learning to some extent or a lot: student absenteeism and students skipping classes, and discipline problems in class, derived from "disruption of classes by students", "the teacher has to wait a long time for students to quieten down" and "students don't start working for a long time after the lesson begins", all always positively inverted (OECD, 2004a, pp. 407, 409, α=.69, N_C=40). PISA 2006: No information given in reports. PISA 2009: Index of disciplinary climate (OECD, 2010c, p. 253, N_C=65). PISA 2012: The average of percentage of students who had arrived late at least once (inverted, OECD, 2013b, p. 168) and index of disciplinary climate based on students' reports (OECD, 2013b, p. 168, N_C=64). All scales standardised and combined (α=.83). Source TIMSS: TIMSS 1995: Not being absent and not leaving school before the end of the school year ("Percent of students who are absent on a typical school day, schools with less than 5% absent", "schools with less than 5% leaving before year end, percent of students" grades 4 and 8, director's assessment, Martin et al., 1999, pp. B11 and B12, B14 and B15, α=.83, N_C=37). TIMSS 1999: Low problems with school and class attendance (index of "seriousness of attendance problems at school", "arriving late at school, absenteeism, skipping class"; percentage of students with high attendance) and in classroom ("classroom disturbance";

percentage of students whose schools reported that disturbances occur at least weekly) (grade 8, Mullis et al., 2000, pp. 240, 244, α=.40, N_C=37). TIMSS 2003: Index of good school and class attendance ("principals' responses to three questions about the seriousness of attendance problems in the school: arriving late at school; absenteeism; and skipping class", grades 4 and 8, Mullis et al., 2004, pp. 324f., α=.78, N_C=45). TIMSS 2007: Index of good attendance at school in grade 4 and 8 (principals' responses to three questions about attendance problems in the school: arriving late at school; absenteeism; and skipping class; high means no problem, Mullis et al., 2008, p. 328, α=.72, N_C=58). TIMSS 2011, based on 4th and 8th grade: "School discipline and safety, reported by principals, average scale score" (Mullis et al., 2012a, p. 270f., 272f.), "students in classrooms where teachers report instruction is limited by disruptive students, some or not at all, percent of students, mathematics" (Mullis et al., 2012a, p. 386f., 388f.), "students in classrooms where teachers report instruction is limited by disruptive students, some or not at all, percent of students, science" (Martin et al., 2012, p. 396f., 398f.), "percent of students whose principals spend 'a lot of time' addressing disruptive student behaviour, inverted" (Martin et al., 2012, p. 262f., 264f.); α=.92, N_C=63. The discipline indicators of the five TIMSS-surveys were combined (α=.64). Source PIRLS: PIRLS 2001: Percentage of students with absenteeism in schools (moderate or serious problem, inverted; Mullis et al., 2003, p. 243, N_C=34). PIRLS 2006: Seriousness of absenteeism in schools, not a problem (Mullis et al., 2007, p. 268, N_C=38). PIRLS 2011: "percent of students whose principals spend 'a lot of time' addressing disruptive student behaviour, inverted" (Mullis et al., 2012b, p. 170f.), "school discipline and safety, reported by principals, hardly any problems, percent of students" (Mullis et al., 2012b, p. 178f.), "students in classrooms where teachers report instruction is limited by disruptive students, some or not at all, percent of students" (Mullis et al., 2012b, p. 232.); α=.52, N_C=48. The three PIRLS surveys combined have Cronbach-α=.82, N_C=57. PISA, TIMSS and PIRLS combined Cronbach-α=.70. Finally we have data for N_C=95 countries, here in the used 93-country data set with information on natives and migrants N_C=93.

Use of *standardised achievement tests, achievement-based decisions*. Source PISA: PISA 2000 no information is given. PISA 2003: Directors' statements: School admission depends on ability ("percentage of students in schools where the principals

consider the following statements as a ‘prerequisite’ or a ‘high priority’ for admittance at school: students’ academic records including placement tests”; OECD, 2004a, pp. 417 a. 314, N_C=37), results of achievement tests are used for streaming (“use of assessment results and student performance in mathematics: group students for instructional purposes”; OECD, 2004a, p. 421, N_C=38), tests are used by school for information of parents about the achievement of their children (“use of assessment results and student performance in mathematics: inform parents about their child’s progress”; OECD, 2004a, p. 421, N_C=38). The three measures were combined (α=.21, N_C=39). PISA 2006: Existence of standards-based external examinations (OECD, 2007, p. 163, N_C=56). PISA 2009: Existence of standards-based external examinations (OECD, 2010c, p. 229, N_C=62). PISA 2012: “Percentage of students in schools whose principal reported that the following factors are considered for admission to school, students’ records of academic performance, always” (OECD, 2013b, p. 282) and “profiles of assessments and examinations across countries and economies, 2: assessment in lower secondary, national exams in upper secondary, few fields requiring tertiary exams, 1: only national exams in lower and upper secondary + National or other non-national examinations in lower or upper secondary, 0: no national or other examinations, most fields requiring tertiary exams” (OECD, 2013b, p. 148), α=.40, N_C=65. The four PISA surveys were combined oriented to the 2012 measure (α=.72). Source TIMSS: Only information from TIMSS 1995 and TIMSS 2011. TIMSS 1995 8th grade for tracking/streaming decisions (“factors that are moderately or very important in deciding courses of study in mathematics, standardised tests”, Martin et al., 1999, p. 64, N_C=20). TIMSS 2011 8th grade “classroom assessment, reported by teachers, percentage of students whose teachers give mathematics tests or examinations, every 2 weeks or more” (Mullis et al., 2012b, p. 410f., N_C=46). Both together α=.51, N_C=54. Source PIRLS: Only information from PIRLS 2006, “emphasis on sources to monitor students’ progress in reading, percentage of students whose teachers reported placing major emphasis on various sources, national or regional achievement tests” (Mullis et al., 2007, p. 238, N_C=37). Both IEA-studies together α=.32, N_C=64. OECD- and IEA-approach together α=.21. We have data for N_C=87 countries (in the here presented analyses N_C=86).

Use of *central exams and objective tests* in educational systems by schools and in entry exams of universities. Data come from Bishop (1997) and Wößmann (also as "Woessmann", 2002, p. 15). The provided information is for mathematics and sciences in school systems (r=.84, sum value α=.91). Bishop's numbers stand for the relative number of secondary school graduates participated in central exams. Two modifications were made: 1. China added (following Heine et al., 2006, central exams "Gao Kao") and 2. the USA were put not at 07 but at 70 on a scale from 0 to 100, because the admission to colleges and universities in the USA is regulated by central and objective competence tests (SAT and ACT), the majority of pupils go at least to colleges and the foundation courses there represent a kind of higher secondary school education in contents and age of students (sum value N_C=53, here N_C=52). The variable represents the use of central exams (independent from proximity to a given curriculum) in schools or at the end of school education for university entrance.

School autonomy: General autonomy. PISA 2003: Autonomy in appointing teachers, in dismissing teachers, in formulating the school budget and in establishing student disciplinary policies (OECD, 2004a, pp. 425, 426, α=.74, N_C=36). PISA 2009: Index of school responsibility for resource allocation and index of school responsibility for curriculum and assessment (OECD, 2010c, pp. 213, 216, α=.70, N_C=64). PISA 2012: "School autonomy over resource allocation, index of school responsibility for resource allocation, mean index" (OECD, 2013b, p. 131, N_C=63). All together α=.86, N_C=72.

School-education quality sum: This indicator includes all variables with theoretical and empirical support for impact on competence development (see similarly Rindermann & Ceci, 2009): a) Kindergarten attendance rate, b) attendance of high grades at a young age, c) tracking at a young age, d) low repetition rates, e) discipline, f) direct instruction, g) standardised achievement tests and achievement-based decisions, h) use of central exams and objective tests, i) school autonomy, j) educational level of teachers and k) proportion of private schools. For many countries only some parts of this information exists (α=.74, total N_C=96, here N_C=93).

1.3 Attributes of students and adults related to education

Identity of language spoken at home and used for test and instruction in school: PISA 2012: Sum of "non-immigrant students who speak another language at home, inverted"

and “immigrant students who speak another language at home, inverted” (OECD, 2013a, Table II.3.5, p. 232). Source TIMSS, TIMSS 2007: Students speak the language of the test at home, always or almost always, grade 4 and 8 (Mullis et al., 2008, pp. 148, 149, α=.99, N_C=58). TIMSS 2011, 4th grade “students spoke the language of the test before starting school, percent of students” (Mullis et al., 2012a, p. 186), “schools with students having the language of the test as their native language, reported by principals, more than 90% of students, percent of students” (Mullis et al., 2012a, p. 218f), 8th grade: “students speak the language of the test at home, reported by students, always or almost always, percent of students” (Mullis et al., 2012a, p. 188f.) and “schools with students having the language of the test as their native language, reported by principals, more than 90% of students, percent of students” (Mullis et al., 2012a, p. 220f.). TIMSS 2011 together α=.94, N_C=62. TIMSS combined α=.92, N_C=70. Source PIRLS: PIRLS 2001: Students speak language of the test at home (Mullis et al., 2003, p. 101, N_C=34). PIRLS 2006: Students speak language of the test at home (Mullis et al., 2007, p. 135, N_C=38). PIRLS 2011: “Schools with students having the language as their native language, more than 90% of students, percent of students” home (Mullis et al., 2012b, p. 144f., N_C=47). PIRLS surveys were combined, standardisation oriented towards the newer and larger 2011 sample (α=.65, N_C=57). PIRLS was combined with TIMSS, standardisation oriented towards the larger TIMSS sample (α=.91, N_C=78). Finally, IEA and OECD studies were combined (α=.93, N_C=91). For countries not having data in this variable information from the source IAEP-II 1991 was added (13 years old, same language home and school, Lapointe et al., 1992, p. 69, N_C=18). This was only Mozambique (no data in the native-immigrant issue, therefore deleted). The final value is given for total N_C=92 countries (here used: N_C=90).

Educational level of adults: The standardised values of three measures were averaged: 1. Adult literacy rate, ability to read and write a simple sentence or similar basic literacy as fill out an application form, 15 years old or older, from Kurian (2001, pp. 349f., N_C=191). 2. Percentage of persons between 12 and 19 years old 1960-1985 (in the interval of student assessment studies from the 1990s on they are adults) having graduated from secondary school (N_C=117), from Mankiw, Romer and Weil (1992). 3. The mean of years of schooling of persons being 25 years or older for 1990, 1995 and 2000 (N_C=107), from Barro and Lee (2000). They all have their data from UNO or

similar sources. The sum (α=.93) is given for N_C=191 countries, here for N_C=89 countries.

1.4 Attributes of society

Three different indicators of general countries' development were used:

Democracy was measured by two indexes: 1. *Democracy-index* (1995-2012) from Vanhanen (2003, with & Åbo Akademi, 2013), measuring competition (share of the votes for parties other than the largest party in parliamentary or presidential elections and in referendums) and participation (percentage of the adult population voting). 2. *Democracy-index* (1995-2012) from Marshall, Gurr and Jaggers (2013). This index is formed from "presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders", "existence of institutionalised constraints on the exercise of power by the executive", and "guarantee of civil liberties to all citizens in their daily lives and in acts of political participation". The homogeneity of the sum value from Vanhanen (quantitative approach) and Marshall et al. (qualitative-quantitative approach) is α=.95, the sum value exists for here N_C=89 countries.

The *Human Development Index* (HDI 2010, here used N_C=86) is a highly general measure of human development used by the UN (consisting of life expectancy 2010, years of schooling 2010, and GNI per capita, ppp 2008 $; United Nations Development Programme/UNDP, 2010, Table 1, pp. 143-146).

Wealth and *productivity* were measured by the Gross domestic product 2003 (GDP per capita, purchasing power parity/ppp, logarithm; UNDP, 2005, here N_C=85). 2003 is approximately in the middle of 1995 and 2012.

1.5 Statistical analysis

Bivariate correlations were supplemented by multiple regressions including as second predictor the general competence level of a country. Regressions were done for the total sample of N_C=93 nations and a selected sample of Western and European countries with a at least 5% immigrant proportion (N_C=38). Significance tests were not used for interpretation (for an in-depth justification e.g., Cohen, 1994; Falk & Greenbaum, 1995; Gigerenzer, 2004; Hunter, 1997).

Especially in comparisons between countries, they are not appropriate for scientific reasoning: The results of significance tests depend on the number of observations. The observations here are for a limited number of countries (here N_C=93), but each country-level observation is based on thousands of individual observations within each country. Possible causal relationships are not more or less true when they are significant or not. More instructive is the demonstration of the stability of relationships across different country samples, different indicators of the same construct, controls of important further variables, and various studies of different authors.

Results at the level of countries do not necessarily correspond to results of analyses at the class or individual level (ecological fallacy). They need a careful comparison with results from within country and multilevel analyses within single surveys and smaller country samples.

Depending on research question differences favouring immigrants (immigrants achieved better results than natives) were also set to zero (language question, educational quality).

2 Further data tables

Supplementary and long data tables are listed here.

Table S1: Proportions of immigrants across different student assessment studies, example USA

Country	**PISA 15 years 2000**	**PISA 15 years 2003**	**PISA 15 years 2006**	**PISA 15 years 2009**	**PISA 15 years 2012**	**TIMSS grade 4 1995**	**TIMSS grade 4 2007**	**TIMSS grade 8 2007**	**PIRLS grade 4 2001**	**PIRLS grade 4 2006**	**Corrected mean**
United States	14%	14%	15%	20%	21%	22%	30%	26%	32%	34%	25%

Table S2: Language question (1), differences between natives and immigrants within PISA reading vs. mathematics and science

Country	**Reading**	**Mathematics**	**Science**
Albania	55	51	59
Argentina	58	54	78
Australia	4	-3	7
Austria	71	76	89
Belgium	98	106	96
Bulgaria	44	121	26
Canada	11	8	20
Chile	-33	-46	-49
Croatia	17	14	20
Denmark	75	72	84
France	43	47	60
Germany	80	77	89
Hong Kong	8	16	8
Indonesia	78	118	143
Israel	0	-4	0
Jordan	-29	-26	-25
Liechtenstein	66	42	47
Luxembourg	77	59	74
Macau	-13	-10	-11
Macedonia	83	79	88
Netherlands	70	77	88
New Zealand	23	8	22
Norway	56	52	65
Peru	0	-22	14
Qatar	-67	-57	-58
Russia	7	18	7
Serbia	-12	-16	-8
Sweden	51	57	60
Switzerland	76	79	84
Thailand	31	36	43
United Kingdom	28	30	33
United States	38	34	44
Mean	34.21	35.92	40.51
SD	40.19	45.44	45.82
N	32	32	32

Note: Based on PISA 2000 and PISA 2006. Only in these surveys results for Reading, Mathematics and Science were reported for natives and immigrants. 2003 only Problem solving, 2009 only Reading, 2012 only Mathematics. Student assessment study points (SAS, *M*=500, *SD*=100).

Table S3: Language question (2), differences between natives and immigrants in countries with “universal languages” vs. others

	English	**French**	**Spanish**	**Arabic**	**Others**
Mean	15.43	47.37	41.61	18.81	35.66
SD	20.14	7.56	13.60	41.88	26.03
N	12	2	10	14	55

Note: Negative native-immigrant-differences not set to zero. Student assessment study points (SAS, *M*=500, *SD*=100).

Table S4: Acculturation question (1), differences between natives and immigrants within PISA between immigrants of second (G2) and first (G1) generation

Country	**Difference G2-G1**
Albania	20
Argentina	4
Australia	10
Austria	14
Azerbaijan	-22
Belgium	3
Brazil	5
Bulgaria	93
Canada	3
Chile	-34
Costa Rica	-16
Croatia	7
Cyprus	19
Czech Republic	-24
Denmark	4
Estonia	0
Finland	36
France	28
Germany	1
Greece	23
Hong Kong	37
Hungary	34
Indonesia	24
Ireland	-3
Israel	3
Italy	31
Jordan	-2
Kazakhstan	41
Kyrgyzstan	27
Latvia	-25
Liechtenstein	28
Luxembourg	8
Macau	4
Macedonia	76
Mexico	26
Montenegro	19
Netherlands	3
New Zealand	-19
Norway	21
Panama	74
Peru	0
Portugal	10
Qatar	-57
Russia	2
Serbia	12
Singapore	20

Slovenia	32
Spain	16
Sweden	37
Switzerland	29
Trinidad and Tobago	-14
United Arab Emirates	-38
United Kingdom	21
United States	10
Mean	12.25
SD	26.52
N	54

Note: Only data from PISA-studies (2000, 2003, 2006, 2009, 2012). Student assessment study points (SAS, *M*=500, *SD*=100).

Table S5: Acculturation question (2), differences between one (M1) and two parent immigrant families (M2)

Country	**Difference M1-M2**
Algeria	-20
Argentina	10
Armenia	25
Australia	1
Austria	41
Bahrain	-27
Belgium	19
Belize	2
Bosnia	42
Botswana	-54
Canada	9
Colombia	-5
Cyprus	18
Czech Republic	27
Denmark	39
Egypt	5
El Salvador	-17
France	23
Georgia	23
Germany	26
Ghana	-7
Greece	22
Hong Kong	-7
Hungary	-14
Iceland	42
Indonesia	0
Iran	-24
Israel	3
Italy	17
Jordan	-21
Kuwait	-31
Latvia	5
Lebanon	2
Luxembourg	40
Macedonia	26
Malta	4
Moldova	-4
Morocco	2
Netherlands	36
New Zealand	6
Norway	49
Oman	-15
Palestine	35
Portugal	31
Qatar	-53
Russia	22

Saudi Arabia	-40
Serbia	16
Singapore	-12
Slovakia	20
Slovenia	25
South Africa	28
Spain	28
Sweden	35
Syria	10
Taiwan	30
Trinidad and Tobago	-13
Tunisia	-4
Turkey	9
Ukraine	27
United Arab Emirates	-70
United Kingdom	19
United States	14
Yemen	-3
Mean	7.32
SD	24.95
N	64

Note: Only data from TIMS- and PIRL-studies (TIMSS 1995 4th grade, TIMSS 2007 4th and 8th grade, PIRLS 2001 and PIRLS 2006). Student assessment study points (SAS, *M*=500, *SD*=100).

Table S6: Information on characteristics of school systems and societies

Country	**Enrol-ment age**	**Repeti-tion rate**	**Young in high grade**	**Disci-pline**	**Use of achieve-ment tests**	**Central exams and tests**	**School auto-nomy**	**School quality**	**Family language = school**	**Educatio-nal level of society**	**Demo-cracy**	**HDI 2010**	**GDP / capita 2003**
Scale	age	%	UK 0	%	%	%	%	UK 0	%	UK 0	1-10	HDR 0-1	US $ ppp
Albania	6.25	4.01	-1.93	64.17	41.44	–	50.06	-1.02	–	-0.59	7.84	.719	4584
Algeria	5.98	–	-1.85	56.22	–	–	–	-2.78	51.52	-2.54	3.69	.677	6107
Argentina	5.89	36.70	-1.73	45.51	12.42	–	56.82	-3.52	82.00	-0.86	8.52	.775	12106
Armenia	6.91	–	-2.64	56.69	41.21	–	–	-0.25	94.24	-0.09	6.07	.695	3671
Australia	5.24	7.13	-0.81	53.91	42.65	81	71.34	-0.65	77.38	0.37	10.54	.937	29632
Austria	6.08	12.61	-1.97	59.84	20.13	0	49.33	-1.94	68.75	-0.24	11.57	.851	30094
Azerbaijan	6.54	3.75	-1.83	66.11	56.90	–	66.97	-1.03	92.58	-0.20	1.80	.713	3617
Bahrain	5.93	–	-1.42	50.96	70.46	–	–	-0.30	75.83	-0.51	0.51	.801	17479
Belgium	5.92	30.70	-1.43	59.34	43.62	0	73.79	-1.73	69.65	-0.03	11.92	.867	28335
Belize	5.21	–	-0.51	41.35	–	–	–	-2.79	36.87	-2.11	5.56	.694	6950
Bosnia	5.98	–	-2.65	60.22	–	–	–	-2.67	94.22	-0.96	4.55	.710	5967
Botswana	6.20	–	-3.06	44.92	33.97	–	–	-3.00	17.43	-2.43	6.13	.633	8714
Brazil	7.06	35.54	-2.36	46.38	15.45	–	56.47	-2.85	–	-1.94	8.86	.699	7790
Bulgaria	6.81	5.61	-2.98	48.37	41.34	100	87.65	-0.58	79.17	-0.15	9.47	.743	7731
Canada	5.67	10.46	-0.98	51.00	34.88	51	67.33	-1.41	73.73	0.55	9.72	.888	30677
Chile	5.91	22.58	-1.46	47.38	34.52	0	77.00	-2.35	99.43	-0.58	8.31	.783	10274
China	6.68	8.26	-1.92	72.70	48.57	100	74.74	-0.05	–	-1.49	0.36	.663	5003
Colombia	5.94	28.34	-2.46	48.87	30.74	0	58.01	-2.69	90.70	-1.44	5.59	.689	6702
Costa Rica	6.47	33.46	-2.81	46.28	41.51	–	59.31	-2.50	–	-1.01	8.81	.725	9606
Croatia	6.60	4.01	-2.75	55.98	50.57	–	71.83	-0.98	97.38	-0.24	7.38	.767	11080
Cyprus	5.76	–	-0.62	55.40	15.81	0	42.98	-2.67	83.71	-0.30	11.09	.810	18776
Czech Republic	6.15	4.80	-2.07	55.98	53.17	100	95.21	-0.09	94.59	-0.01	10.39	.841	16357
Denmark	6.74	3.98	-3.14	54.97	28.20	100	75.98	-1.07	88.89	0.46	12.46	.866	31465
Egypt	6.20	–	-1.55	68.93	–	–	–	-0.31	77.76	-2.32	1.21	.620	3950
El Salvador	7.07	–	-3.50	39.63	–	–	–	-4.09	91.14	-2.30	6.75	.659	4781

Estonia	6.88	6.45	-3.82	49.36	50.34	–	82.46	-0.91	–	-0.03	8.98	.812	13539
Finland	6.75	3.15	-2.88	55.42	35.14	100	62.04	-1.01	91.13	0.54	11.29	.871	27619
France	5.95	34.02	-1.57	53.29	39.30	50	51.75	-1.79	81.19	-0.23	9.42	.872	27677
Georgia	6.07	–	-1.19	52.87	52.51	–	–	-0.27	94.79	-0.04	5.96	.698	2588
Germany	6.10	18.91	-2.48	59.04	25.93	35	47.70	-1.56	78.26	0	11.14	.885	27756
Ghana	6.20	–	-5.47	46.72	65.84	–	–	-2.41	19.74	-2.47	6.20	.467	2238
Greece	6.09	7.06	-0.43	52.33	13.36	0	49.54	-2.14	90.06	-0.45	11.45	.855	19954
Hong Kong	6.00	14.19	-1.56	66.62	50.59	100	86.08	-0.25	72.82	-0.44	–	.862	27179
Hungary	6.50	10.41	-2.65	54.63	55.91	100	88.87	-0.40	94.27	0.01	9.98	.805	14584
Iceland	6.16	1.75	-0.37	58.10	34.61	50	84.32	-0.80	78.95	0.07	13.19	.869	31243
Indonesia	6.28	12.82	-2.05	49.18	43.22	100	71.90	-1.65	32.47	-2.05	6.71	.600	3361
Iran	6.28	–	-1.87	55.22	44.93	100	45.84	-1.93	58.39	-1.96	1.45	.702	6995
Ireland	5.45	10.07	-1.88	58.72	46.32	100	67.33	-0.69	73.96	0.34	10.40	.895	37738
Israel	6.04	4.24	-1.13	48.74	45.06	100	75.58	-0.82	79.42	0	10.72	.872	20033
Italy	5.90	16.02	-0.77	53.91	42.01	100	47.76	-1.52	83.52	-0.80	11.35	.854	27119
Japan	5.97	.89	-1.49	66.01	41.64	100	70.11	-0.23	97.37	0.39	10.39	.884	27967
Jordan	5.82	8.21	-0.85	56.94	50.13	100	46.47	-1.33	87.70	-0.51	1.48	.681	4320
Kazakhstan	6.51	1.77	-2.53	67.85	52.34	–	55.76	-0.79	79.48	-0.18	1.31	.714	6671
Korea-South	5.93	2.02	-1.39	66.12	49.13	100	61.65	-0.14	96.14	0.32	8.47	.877	17971
Kuwait	5.94	–	-1.39	42.15	38.06	0	48.15	-2.76	70.66	-0.86	0.55	.771	18047
Kyrgyzstan	6.72	4.50	-2.70	66.33	56.90	–	65.28	-0.67	–	-0.22	3.30	.598	1751
Latvia	6.82	9.29	-3.06	51.59	42.92	50	86.28	-1.42	83.59	-0.04	8.94	.769	10270
Lebanon	6.20	–	-2.00	74.09	67.95	–	–	.48	13.86	-0.54	6.54	–	5074
Liechtenstein	6.29	19.79	-3.19	63.07	55.67	–	72.32	-0.79	–	-0.01	–	.891	–
Lithuania	6.76	3.84	-3.01	53.87	45.09	100	87.15	-0.77	92.40	-0.04	9.37	.783	11702
Luxembourg	6.00	33.31	-3.63	55.73	40.28	–	53.86	-1.93	-2.62	-1.05	9.83	.852	62298
Macau	6.09	36.50	-2.74	59.01	25.04	–	99.92	-1.16	–	-0.75	–	–	–
Macedonia	6.75	–	-2.62	53.92	37.45	0	79.94	-1.75	86.26	-0.78	7.72	.701	6794
Malaysia	6.78	0	-1.37	51.69	35.94	100	54.86	-1.31	55.61	-1.01	4.85	.744	9512
Malta	4.89	–	-0.52	59.07	–	–	–	-1.11	15.79	-0.72	11.56	.815	17633
Mexico	6.03	18.82	-1.98	55.75	25.55	–	65.69	-2.27	–	-1.10	7.49	.750	9168
Moldova	6.59	–	-2.92	43.27	88.04	100	–	-1.10	83.91	-0.24	7.38	.623	1510

Montenegro	6.57	5.55	-2.66	58.39	38.51	–	72.26	-1.03	–	–	8.28	.769	–
Morocco	6.38	–	-2.90	40.63	36.45	100	–	-2.57	53.85	-3.38	1.08	.567	4004
Netherlands	5.69	24.70	-1.82	57.38	63.98	100	92.57	-0.91	84.60	0.26	12.02	.890	29371
New Zealand	5.14	5.38	.20	52.08	49.00	100	84.73	-0.55	78.80	0.89	10.81	.907	22582
Norway	5.97	.89	-0.63	56.81	38.21	65	66.83	-1.04	85.31	0.62	11.47	.938	37670
Oman	5.98	–	-0.97	55.08	34.66	–	–	-1.93	83.58	-3.05	0.36	–	13584
Palestine	5.66	–	-0.82	48.72	59.59	–	–	-1.15	88.70	–	–	–	–
Panama	5.70	30.47	-1.98	55.72	12.49	–	58.01	-2.87	–	-0.06	8.96	.755	6854
Peru	5.98	27.22	-1.27	51.32	13.97	–	68.51	-2.37	–	-0.83	7.05	.723	5260
Poland	6.30	5.93	-1.92	53.95	41.94	–	80.54	-0.69	98.66	0.30	8.90	.795	11379
Portugal	6.01	35.67	-1.71	55.59	24.62	0	48.88	-2.38	94.64	-1.54	9.87	.795	18126
Qatar	5.98	15.85	-0.83	47.12	48.32	–	59.82	-1.63	59.86	-1.47	0.36	.803	19844
Romania	6.77	5.16	-3.24	54.69	40.30	50	48.61	-1.46	92.40	-0.24	8.76	.767	7277
Russia	6.47	3.57	-2.31	55.85	57.87	100	81.86	-0.23	85.85	-0.15	6.18	.719	9230
Saudi Arabia	5.66	–	-1.17	52.19	59.22	–	–	-1.84	83.29	-2.81	0.36	.752	13226
Serbia	6.91	4.92	-3.12	49.74	35.95	–	76.28	-1.84	93.14	-0.52	6.62	.735	–
Singapore	6.45	5.60	-1.67	62.36	59.38	100	59.80	-0.34	34.12	-0.59	2.86	.846	24481
Slovakia	6.13	5.08	-1.88	53.34	48.96	100	86.94	-0.27	86.32	-0.01	9.33	.818	13494
Slovenia	6.46	5.01	-0.99	54.13	39.81	100	78.06	-0.97	82.03	-0.01	10.01	.828	19150
South Africa	6.77	–	-4.34	42.84	33.62	100	–	-2.07	43.99	-1.71	6.98	.597	10346
Spain	5.85	35.55	-1.31	56.49	34.34	0	55.38	-1.99	69.03	-0.66	11.18	.863	22391
Sweden	6.82	4.36	-2.91	54.71	31.55	50	91.02	-1.03	80.53	0.16	11.66	.885	26750
Switzerland	6.49	18.92	-2.21	59.93	27.72	0	75.90	-1.82	–	-0.43	11.52	.874	30552
Syria	5.98	–	-0.65	42.41	41.08	–	–	-3.05	84.65	-1.43	1.11	.589	3576
Taiwan	6.60	2.31	-1.52	65.55	56.21	100	79.45	-0.14	62.67	-0.35	9.08	–	–
Thailand	6.07	4.03	-1.62	57.38	52.70	100	73.65	-0.56	72.60	-1.45	5.70	.654	7595
Trinidad Tob.	5.17	27.63	-1.65	48.94	50.96	–	54.73	-2.10	95.73	-0.41	9.55	.736	10766
Tunisia	5.85	45.10	-2.13	43.18	23.46	100	43.74	-3.10	42.56	-2.50	1.73	.683	7161
Turkey	6.44	13.20	-1.37	48.96	38.38	100	41.59	-1.68	84.63	-1.79	7.90	.679	6772
Ukraine	7.07	–	-1.44	56.33	61.86	–	–	-0.51	67.53	-0.12	8.73	.710	5491
U. Arab Emir.	5.76	12.14	-0.70	55.46	57.36	–	88.02	-0.80	55.81	-1.48	0.36	.815	22420
U. Kingdom	5.07	2.92	0	58.05	50.41	100	99.00	0	86.03	0	10.27	.849	27147

United States	6.04	14.19	-1.27	52.33	41.53	70	83.23	-0.73	77.21	0.93	10.72	.902	37562
Uruguay	5.90	41.12	-2.20	50.97	17.28	–	46.59	-3.80	–	-0.74	10.95	.765	8280
Vietnam	6.11	7.70	-1.21	71.18	59.20	–	56.89	-0.44	–	-0.45	1.02	.572	2490
Yemen	6.20	–	-3.90	41.17	–	–	–	-3.65	88.21	-4.09	1.65	.439	889
Country	**Enroll-ment age**	**Repeti-tion rate**	**Young in high grade**	**Disci-pline**	**Use of achieve-ment tests**	**Central exams and tests**	**School auto-nomy**	**School quality**	**Family language = school**	**Educatio-nal level of society**	**Demo-cracy**	**HDI 2010**	**GDP / capita 2003**
Mean	6.18	13.83	-1.94	54.55	42.27	70.23	68.00	-1.44	76.43	-0.71	7.30	.76	15028
SD	0.47	12.30	1.00	7.37	14.35	40.95	15.47	1.00	20.48	1.00	3.74	.10	11326
N	93	68	93	93	86	52	72	93	90	91	89	88	87
Inverted?	Inverted	–	–	–	–	–	–	–	–	–	–	–	–

Notes: Majority of scales has been transformed and adapted before aggregation. Scales: *Enrolment age* in years; *Repetition rate* in percentages; *Young in high grade* UK set at 0, SD=1; *Discipline* in percentages (students not coming too late); *Use of achievement tests* in percentages; *Central exams and tests* approximately stand for percentages of students taking central exams; *School autonomy* in percentages; *School quality* (general) UK set at 0, SD=1; *Family language = school* in percentages; *Educational level of society* UK set at 0, SD=1; *Democracy* is based on the Polity from 0 to 10 (higher values due to combination with Vanhanen); *HDI 2010* from 0 to 1; *GDP per capita 2003* ppp in US $.

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