# Database international school system characteristics and flexibility indicators

Maastricht University

ROA

# Manual
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**Researchcentrum voor Onderwijs en Arbeidsmarkt | ROA**
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Manual

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This manual accompanies the Excel file International Flexibility indicators. This database can be downloaded at the ROA website: https://roa.nl/projects/flexibility-educational-systems-and-social-inequality-educational-outcomes

# Table of Contents

# 1. Introduction

This manual accompanies the dataset 'International Flexibility Dataset'. The dataset contains information on a range of country-level variables that were used in the analyses of Somers et al. (2023)[1] and Somers and Van der Velden (2023)[2]. These two studies were conducted as part of the NRO-funded project on 'How the flexibility of the Dutch educational system affects (social inequality in) educational outcomes'.

The dataset contains a set of variables related to countries' schooling systems. The variables are obtained from three international databases on student performance (TIMSS, PIRLS and PISA), and a range of other data sources including scientific papers and reports. The first variable concerns the cut-off date that school systems use to determine the timing that children enter school (see Section 2.1.1). The cut-off date determines before which date a child needs to have reached a specific age before it can enrol into the school system. We use this variable in Somers et al. (2023) to determine students' relative age in a school-entry cohort. In Somers et al. (2023), we examine the performance gap between relatively old and relatively young students in primary education (grade 4) and secondary education (grade 8 or at age 15). In the same study, we analyse how the practice of early ability tracking affects the development in the performance differential between relatively old and young students over time. In this dataset, we also include information on the timing of tracking for a set of countries (see Section 2.1.2). In addition, the dataset contains a number of variables that are indicative for the flexibility of countries' education system (see also Wessling & Van der Velden (2021)[3] for a detailed discussion on flexibility indicators). The first variable indicates whether countries apply the practice of grade retention (see Section 2.2.1). The second variable captures the percentage of 'on-track' students in a specific grade. This second variable reflects the extent to which countries apply grade retention, but it also captures the practice of grade acceleration and early/delayed school enrolment (see Section 2.2.2).

# 2. Database

## 2.1 Characteristics of schooling systems

### 2.1.1 Cut-off date for school eligibility

The Excel sheets 'TIMSS School-Cut-off dates', 'PIRLS School-Cut-off dates' and 'PISA School-Cut-off dates' contain information on the cut-off dates for school eligibility that applied to the sampled students in the different survey waves of TIMSS, PIRLS and PISA. The cut-off date for school eligibility determines when a child is allowed to enrol in the school system. For example, if a country has set the cut-off date at January 1, a child typically enrols into school when a specific age has been reached by

[1] Somers, M., Janietz, C., Van der Velden, R., & Korthals, R. (2023). Early tracking and relative age effects in education. Unpublished manuscript. Research Centre for Education and the Labour Market, Maastricht University.
[2] Somers, M., & Van der Velden, R. (2023). Grade cohorts and school-entry cohorts: Does it matter for international comparisons? An exploration of possible effects of the sampling design using TIMSS and PIRLS. Unpublished manuscript. Research Centre for Education and the Labour Market, Maastricht University.
[3] Wessling, K., R. van der Velden (2021), Flexibility in educational systems: Concept, indicators, and directions for future, ROA-RM-2021/2, Maastricht.

January 1 in a specific school year. Children who are born just after the cut-off date become the oldest in their school-entry cohort, while children born just before the cut-off date are the youngest in their school-entry cohort. This is because children born right after the cut-off date usually have to wait an entire year before they enrol into school, while they are only slightly younger than the children born just before the cut-off date.

The cut-off dates vary across countries and determining the cut-off date is not straightforward. In most countries, parents and schools have some leeway in determining when a child exactly enrols into school. For example, in the Netherlands, children who reach the age of five before 1 October typically enrol school in that same year. Nevertheless, parents and teachers can decide to delay or advance enrolment with 1 year depending on the child's maturity. To determine the cut-off date for school eligibility for each country-survey combination, we used the empirical distribution of students' month and year of birth. The first month of the twelve consecutive months containing the largest percentage of birth dates is defined as the cut-off date. This approach is similar to Bedard and Dhuey (2006).[4] The cells in the Excel sheet show for each survey wave in which time period students had to be born in order to enrol into school in a specific school year. For example, cell E:4 in the Excel sheet 'TIMSS School Cut-off-dates' shows that the largest percentage of sampled 4$^{th}$ graders (71.12%) in Algeria in TIMSS 2007 were born between January 1997 and December 1997. Hence, the empirically determined cut-off date for school eligibility is January 1997. These students enrolled into the first grade in 2003 (see cell E:3).

In the dataset, we also included the cut-off dates that were reported in other data sources. These data sources include the published papers by Bedard and Dhuey (2006)[1], Webbink and Gerritsen (2013)[5] and Martins and Pereira (2017)[6]. Furthermore, the dataset includes the cut-off dates reported by country experts in the curriculum questionnaires from TIMSS 2007, 2011 and 2015 and PIRLS 2006, 2011 and 2016.[7] Moreover, the TIMSS 2011 and 2015 curriculum questionnaires respectively also contain information about whether any changes took place concerning the school eligibility age between 2002-2011 and 2006-2015. Also the PIRLS 2011 and 2016 curriculum questionnaires provide information about any policy changes that were implemented between 2002-2011 and 2007-2016.

We checked the empirically determined cut-off dates in TIMSS and PIRLS against the cut-off dates reported in other data sources. In the case that we were quite certain about the empirically defined cut-off date, we marked the cell yellow. We considered cut-off dates to be clear when the number of sampled students who were born outside the birthdate range clearly dropped. In the case that we were uncertain about the cut-off date, we checked the cut-off against the dates reported in other data sources. If the cut-off dates matched, we also marked the cells yellow. Cut-off dates that remained uncertain to us are marked orange. In the case of PISA, the samples typically consist of twelve birth

[4] Bedard, K., & Dhuey, E. (2006). The persistence of early childhood maturity: International evidence of long-run age effects. *The Quarterly Journal of Economics*, *121*(4), 1437-1472.
[5] Webbink, D., & Gerritsen, S. (2013). *How much do children learn in school? International evidence from school entry rules*. CPB Netherlands Bureau for Economic Policy Analysis, No. 255. https://www.cpb.nl/sites/default/files/publicaties/download/cpb-discussion-paper-255-how-much-do-children-learn-school.pdf
[6] Martins, L. & Pereira, M.C. (2017). Disentangling the channels from birthdate to educational attainment. Working Papers w201706, Banco de Portugal, Economics and Research Department. https://www.bportugal.pt/sites/default/files/anexos/papers/wp201706_1.pdf
[7] The TIMSS and PIRLS data can be obtained from https://timssandpirls.bc.edu/databases-landing.html.

months which we report in the Excel sheet 'PISA School-Cut-off dates'. In each cell, we also indicate which grade the students in the sampled birthdate range are expected to attend if they would be 'on-track'. On-track students are observed in the grade that they are expected to attend given their year and month of birth. As can be noted, some countries sampled students that are part of two school-entry cohorts. This is because most countries sampled students who are born between January and December in a certain year, while the cut-off for school eligibility is not always the 1st of January. The countries that sampled perfect school-entry cohorts are marked in yellow.

The final cut-off date list that we used in Somers et al. (2023) can be found under the Excel sheet 'Final Cut-off List'. In Somers et al. (2023) we used country pairs to perform a set of difference-in-differences analyses where we combine the test scores of students at two educational stages (i.e. primary and secondary education). Note that the 'Final Cut-off List' sheet only contains the cut-off dates of countries for which we could form a pair at two educational stages. The list of cut-off dates under 'Certain' includes the countries for which we could identify a clear empirically determined cut-off date. Moreover, these empirically determined cut-off dates largely matched the cut-off dates reported in other data sources. The list of cut-off dates under 'Uncertain' includes the countries for which the empirically determined cut-off dates were somewhat unclear or did not perfectly match the cut-off dates reported in other data sources. In cell B:15 we indicate the number of potential country pairs that are formed in the case that countries are included for which the cut-off dates are uncertain (i.e. 83 country pairs).

Finally, the list of cut-off dates under 'Not known' includes the set of countries for which we could not identify a cut-off date. For some countries, we could not identify a clear cut-off date due to variation in state or school regulations. While for some countries we know from which states the test scores we obtained (e.g. Canada), for Australia and the United States we do not observe the state. In a few countries, we could not identify a clear cut-off date because the cut-off date is not on the first date of a specific month. In the TIMSS, PIRLS and PISA data, we only observe in which month students are born but not on which day. Finally, for some countries we could not empirically identify a clear cut-off date. In cell B:29 we indicate the number of country pairs that are lost because the cut-off date could not be identified (i.e. 155 country pairs).

The Excel sheet 'Other CNT School-Cut-off Dates' contains the empirically determined cut-off dates for countries that were not included in Somers et al. (2023).

### 2.1.2 Age and grade of tracking

The Excel sheet 'Early Tracking CUT-OFF' provides information about the age and grade at which school systems start with ability tracking. These indicators are used in Somers et al. (2023). Columns D until I show the grade after which selection occurs according to different data sources (Amadio,

2000[8]; OECD, 2016[9]; Ruhose & Schwerdt, 2016[10]; Waldinger, 2006[11]; UNESCO, 2007[12]; UNESCO, 2012[13]). In column C, we indicate the most likely grade after which selection occurs after comparing the grades reported by different data sources. The green cells indicate that ability tracking occurs after grade 7 (or after lower grades) and the red cells indicate that tracking occurs after grade 8. Columns K until P contain information from different data sources on the age at which students are selected into tracks (Brunello & Checchi, 2017[14]; OECD, 2005[15]; OECD, 2008[16]; OECD, 2010[17]; OECD, 2013;[18] OECD, 2016[19]). In column J, we report the most likely age after which selection occurs after comparing the age reported by different data sources. The green cells indicate that ability tracking occurs at the age of 13 (or lower) and the red cells indicate that tracking occurs at the age of 15 or higher. The Excel sheet also contains variables that indicate whether tracking took place before the test scores were measured in grade 8 in TIMSS. The Excel sheet 'Early Tracking OTHER' contains early tracking variables for countries that were not analysed in Somers et al. (2023).

## 2.2 Flexibility indicators

### 2.2.1 Retention and cut-off strictness

The Excel sheet 'Retention & Cut-off Strictness' contains information from the curriculum questionnaires in TIMSS 2007, 2011 and 2015. In these questionnaires, country experts reported whether their country applies the practice of grade retention. A 'yes' implies that the country experts indicated that retention occurs, while a 'no' indicates that grade retention does not happen. If there is a number in between brackets in the cell, e.g. cell C7 indicates 'Yes (6+)', it means that grade repetition occurs from grade 6 onwards. Before this grade, school automatically progress children to the next grade. We marked the cells green or red when the information provided by country experts

[8] Amadio (2000). *World data on education: A guide to the structure of national education systems.* UNESCO Publishing.
[9] OECD (2016). 2016 Diagrams of education systems. Retrieved from OECD website https://gpseducation.oecd.org/
[10] Ruhose, J., & Schwerdt, G. (2016). Does early educational tracking increase migrant-native achievement gaps? Differences-in-differences evidence across countries. *Economics of Education Review*, *52*, 134-154.
[11] Waldinger, F. (2006). Does tracking affect the importance of family background on students' test scores?. *Unpublished manuscript, LSE*.2
[12] UNESCO (2007). World Data on Education: Sixth edition 2006-07. Retrieved from UNESCO International Bureau of Education website https://www.ibe.unesco.org/en/document/world-data-education-sixth-edition-2006-07
[13] UNESCO (2012). World Data on Education: Seventh edition 2010-11. Retrieved from UNESCO International Bureau of Education website https://www.ibe.unesco.org/en/document/world-data-education-seventh-edition-2010-11
[14] Brunello, G., & Checchi, D. (2007). Does school tracking affect equality of opportunity? New international evidence. *Economic policy*, *22*(52), 782-861.
[15] OECD (2005). *School factors related to quality and equity: Results from PISA 2000.* PISA, OECD Publishing, Paris. https://doi.org/10.1787/9789264008199-en
[16] OECD (2008). *PISA 2006: Volume 2: Data.* PISA, OECD Publishing, Paris. https://doi.org/10.1787/9789264040151-en
[17] OECD (2010). *PISA 2009 results: What makes a school successful?: Resources, Policies and Practices (Volume IV).* PISA, OECD Publishing, PISA. https://doi.org/10.1787/9789264091559-en
[18] OECD (2013). *PISA 2012 results: What makes schools successful: Resources, Policies and Practices (Volume IV).* PISA, OECD Publishing, Paris. https://doi.org/10.1787/9789264201156-en
[19] OECD (2016). *PISA 2015 Results (Volume II): Policies and practices for successful schools.* PISA, OECD Publishing, Paris. https://doi.org/10.1787/9789264267510-en

was in line with what we empirically observed. We marked the cells orange when the information offered by country experts is not in line with our empirical observation. For example, the country expert of Finland indicated in the TIMSS curriculum questionnaire that grade retention is not a commonly applied practice, while the data show that only 94.4% of the students are on-track in TIMSS 2011 (see Excel sheet 'Share Ontrack').

Moreover, the Excel sheet 'Retention & Cut-off Strictness' contains information from the TIMSS 2011 and TIMSS 2015 curriculum questionnaires on the school entry rules and the discretion that parents have to deviate from the official school-entry rules. The country experts answered the following questions: "In your country, what is the stated official policy or regulation on students' age of entry to primary school (ISCED Level 1)?" and "If the official policy allows some parental discretion or choice, please describe the usual practice."

### 2.2.2 Share of on-track students

The final Excel sheet 'Share Ontrack' in the Excel file contains information on the percentage of students who are so-called 'on-track' for each country. The percentages are displayed for several survey waves of TIMSS primary education (1995, 2003, 2007, 2011, 2015), TIMSS secondary education (1995, 1999, 2003, 2007, 2011, 2015), PIRLS (2001, 2006, 2011), and PISA (2000, 2003, 2006, 2009, 2012, 2015). Whenever countries sampled more than one grade, the two grade samples were pooled together. The sheet 'Share Ontrack' also contains information on the percentage of students who are on-track combined for all TIMSS primary education survey waves, all PIRLS survey waves, all TIMSS secondary survey waves, and all PISA survey waves. We pooled the data from all relevant survey waves to calculate the percentage of on-track students. Moreover, the sheet 'Share Ontrack' provides the percentage of students who are on-track combined for all primary education surveys (TIMSS and PIRLS), secondary education surveys (both TIMSS and PISA), and all survey waves combined.

Students are on-track if we observe them in the expected grade given their month and year of birth. We typically observe students in the expected grade if they complied with the cut-off date for school eligibility and if they never repeated or skipped a grade. Some countries strictly enforce the cut-off date for school eligibility and simultaneously apply the practice of automatically promoting students to the next grade. These countries for example include Japan, Iceland and England, where almost 100% of the students are on-track in a given grade. Other countries like the Netherlands, Germany and Portugal show a large percentage of students who are off-track. In these countries, students do not strictly comply with the cut-off date and grade repetition occurs frequently. We consider smaller percentages of on-track students as an indicator that these countries are more flexible (see also Wessling & Van der Velden, 2021).