LISER
Luxembourg Institute of Socio-Economic Research

POLICY BRIEF ISSUE 2026-07

Closing the school-entry age gap in Luxembourg through early childhood education

Andrea Albanese, Audrey Bousselin

Luxembourg Institute of Socio-Economic Research (LISER)

Corresponding author:
Audrey Bousselin
audrey.bousselin@liser.lu

Most OECD countries use a fixed date of birth to determine when children start school. In Luxembourg, for example, a child born on 31 August starts school a full year earlier than a child born on 1 September. This difference in timing has substantial consequences for children's learning, progression and long-term opportunities. Almost 1 in 4 children born in August repeat a year by the age of 8, compared with around 1 in 8 children born in September, with a larger impact on disadvantaged and migrant families. The penalty associated with school entry age is highly relevant for policy-makers because grade repetition is unfair, costly, and shapes later educational pathways. New evidence from the CSA reform (*Chèque-Service Accueil*) shows that expanding access to Early Childhood Education and Care (ECEC) can significantly reduce this disparity. Strengthening ECEC provision therefore offers a practical policy lever to improve fairness and the overall efficiency of the education system.

The school-entry age penalty: not just a Luxembourg issue

The disadvantage faced by children born just before the school-entry cut-off date is well documented across countries. A recent review covering over 260 studies in more than 20 OECD countries (Cavallo et al. 2026) shows that fixed cut-off rules consistently generate penalties of similar magnitude. In countries such as the United States, Germany, Austria, Belgium, France and Switzerland, younger children are around 10 to 14 percentage points more likely to repeat a year. Luxembourg is no exception, as it enforces a strict enrolment rule based on date of birth.

The consequences extend beyond grade repetition. International evidence shows that younger pupils tend to perform worse in standardised tests and are more likely to be placed in lower academic streams. They also experience less favourable socio-emotional outcomes, including lower self-confidence and weaker peer relationships. Some studies further report higher rates of attention deficit disorder diagnoses among the youngest children in a class, which is likely to reflect differences in relative maturity rather than underlying conditions (Elder 2010; Morrow et al. 2012). In education systems with early academic tracking such as in Luxembourg,[1] these initial disadvantages can persist over time, influencing track placement, educational attainment, and ultimately labour market outcomes. Consequently, a difference of just a few days around an administrative cut-off can have lasting effects on children's life trajectories.[2] Despite this evidence, there is limited causal evidence on whether early interventions can mitigate these disadvantages. Building on Albanese and Bousselin (2026), this policy brief aims to fill this gap.

Data and approach

The study uses anonymised administrative records on the universe of children who attended Luxembourg public schools between 2003 and 2012, covering about 50,000 pupils, linked to childcare voucher records and family background information. Because the 1 September cut-off leaves parents no discretion over school entry, children born in late August and early September are otherwise comparable, allowing differences in outcomes to be attributed to age at school entry.

A simple comparison between children who attended early ECEC and those who did not would be misleading, as these groups differ in many ways. To identify causal effects, the study exploits variation in the 2009 CSA reform (*Chèque-Service Accueil*), which expanded childcare provision unevenly across municipalities. It compares how the August–September gap evolved in areas with larger versus more limited expansion.

1 Several countries, including Austria, Belgium, the Czech Republic, Germany, Hungary, the Netherlands, Turkey and Singapore, also track students at an early age.

2 See Bedard and Dhuey (2006), Elder and Lubotsky (2009), Puhani and Weber (2007), Givord (2024), Schneeweis and Zweimüller (2014), Dustmann et al. (2017), or Fredriksson and Öckert (2014).

Key findings

A large and persistent age penalty in grade repetition (*allongement de cycle*)

Starting school a year early increases the likelihood of repeating a year by 10 to 15 percentage points. Given that about 12 percent of September-born children repeat a year, this roughly doubles the risk for those just born before the cut-off. This gap remains substantial up to the age of 12 and is even larger for children from blue-collar families[3] (around 17 percentage points) and for those with a migration background (around 15 percentage points).

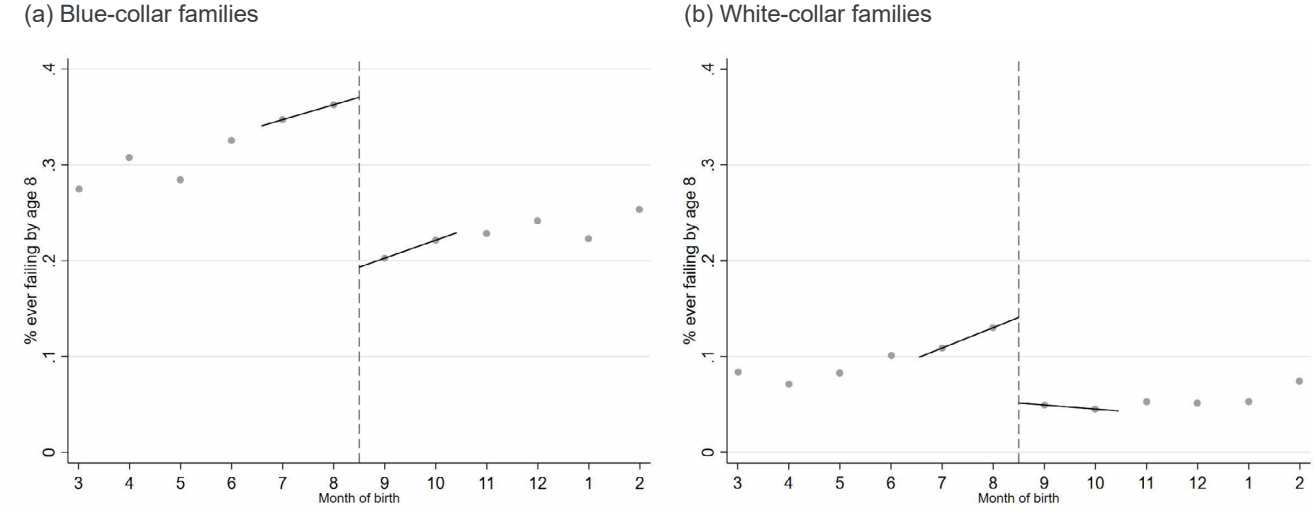
Figure 1 highlights these disparities. Among children from blue-collar families, nearly 37 percent of those born in August have repeated a grade by age 8, compared with about 20 percent of those born in September. Among children from white-collar families[4], the gap is much smaller in absolute terms, from about 5 to 13 percent. Overall, children from blue-collar families are nearly three times as likely to repeat a grade, and the penalty of being the youngest in the class is also much larger for these children. These patterns align with international evidence, confirming that Luxembourg's age penalty is not an anomaly, but rather a systematic feature of education systems with fixed cut-off rules.

Early childhood education and care reduces the age penalty by up to 50 percent

The 2009 CSA reform introduced a national voucher scheme subsidising between 60 and 100 percent of childcare costs. Although implemented nationwide, the actual expansion varied significantly across municipalities, reflecting differences in pre-existing supply and local demand.

In municipalities that experienced the largest expansions in childcare provision, grade repetition declined more markedly among younger children. The age penalty fell from 21–26 percentage points to around 13 percentage points – a reduction of roughly 40–50 percent.

Figure 1 – Grade repetition by age 8 and month of birth, by parental occupational background



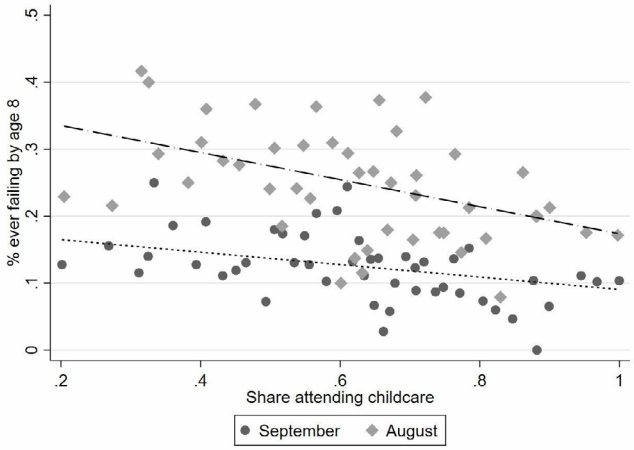
Notes: Each dot represents the average grade repetition rate by age 8 for a given month of birth. The dashed vertical line marks the 1 September cut-off. Children born in August (left of the line) are the youngest in their cohort; children born in September (right of the line) are the oldest in the next cohort. The jump at the cut-off is the school-entry age penalty. Among blue-collar families (panel a), the penalty is roughly 17 percentage points (from about 20% to 37%). Among white-collar families (panel b), it is about 8 percentage points (from about 5% to 13%).

Source: Authors' calculations from linked administrative data.

3 Blue-collar families are families in which the main earners work in manual, routine, or physically demanding jobs, such as construction, manufacturing, maintenance, or transport.

4 White-collar families are families in which the main earners work in non-manual, typically office-based jobs, such as administrative, managerial, or professional occupations.

Figure 2 – Grade repetition by age 8 for August-born vs September-born children, by local childcare coverage



Notes: Each point represents a municipality–cohort cell. The vertical axis shows the share of children who have repeated a grade by age 8. Dark circles denote September-born children (the oldest in their cohort), light diamonds denote August-born children (the youngest). The lines show OLS fitted values. The vertical gap between the two lines is the school-entry age penalty. As local childcare coverage increases (horizontal axis), the gap narrows.

Source: Authors' calculations from linked administrative data.

As Figure 2 shows, the gap between children born in August and those born in September narrows as local childcare coverage increases. This effect is sizeable: it is comparable to delaying school entry by around six months, without altering enrolment rules.

Benefits are largest for disadvantaged children

The reduction in the age penalty is concentrated among the groups facing the highest baseline risks: children from blue-collar families and those with a migration background. For these children, the reform reduces the age penalty by more than 10 percentage points, while effects for more advantaged groups are minimal. This suggests that expanding ECEC can play a key role in reducing educational inequalities.

Two mechanisms likely explain these results. First, disadvantaged children are more likely to be at risk of grade repetition, so improvements in school readiness translate into greater gains in progression. Second, these groups faced greater constraints in accessing childcare prior to the reform. Therefore, the expansion increased their access more than that of other groups, leading to larger improvements in outcomes. These findings are consistent with earlier descriptive evidence from Luxembourg, which reports larger benefits of childcare attendance among migrant and Portuguese-speaking children (Hornung et al. 2023).

Why this matters for Luxembourg

These findings are particularly relevant given four key features of Luxembourg's education system.

High grade repetition rates

Luxembourg has one of the highest rates of grade repetition among OECD countries, with around 15 per cent of children repeating a year by age 8. A significant proportion of this repetition is driven by birth timing, with the greatest risk among children born just before the September cut-off. As the rule leaves parents with no flexibility over enrolment timing, some children are disadvantaged purely because of when they were born.

A diverse and growing school population

Luxembourg's p opulation is characterised by high levels of migration and linguistic diversity. Children from migrant backgrounds face higher baseline repetition rates and larger age penalties, but they would benefit most from expanded childcare access. As these families often lack informal support from nearby relatives such as grandparents, access to formal childcare is particularly important for them. With the share of children from migrant backgrounds continuing to grow, policies that improve their school readiness are becoming increasingly important.

Multilingual curriculum demands

Luxembourg's school system requires children to learn multiple languages from an early age. This is challenging for all children and may amplify the disadvantage of starting school at a younger age, particularly for those whose home language differs from the languages of instruction. Early exposure to structured early childhood education can help build the linguistic and social foundations needed to meet these demands.

Early academic tracking with longlasting consequences

At the end of primary school, every child is placed into either the academic track (*enseignement secondaire classique)* or the vocational track (*enseignement secondaire général*). The former is the main route to university, while the latter is more vocational, with some pathways to higher education. This decision is based on academic performance. As the youngest children in the class tend to perform worse academically, even small

differences in date of birth can translate into different educational pathways. Evidence from countries with early tracking, such as Austria and Germany, shows that these effects can persist into adulthood, impacting educational attainment and future earnings. Expanding access to early childhood education can help to mitigate these disparities by improving school readiness among younger children.

Policy implications

Inform parents about the age gap

Many parents underestimate the impact of the 1 September cut-off on early school outcomes. A child born in late August is twice as likely to repeat a year by age 8 as a child born in early September. This matters for how families interpret their child's initial struggles at school. Difficulties that may appear to be a lack of ability often stem from being the youngest in the class. Clearer communication can help families better interpret early difficulties and respond appropriately.

Close the childcare take-up gap, on both the supply and the demand sides

The results show that ECEC attendance improves the school performance, particularly for younger children and those from disadvantaged households. Policy should focus both on expanding provision and increasing uptake. On the supply side, priorities include improving ECEC affordability through the voucher system, and increasing the number of subsidised places, especially in municipalities where coverage remains limited. On the demand side, many families still view ECEC primarily as childcare, overlooking its role in fostering school readiness for children who are youngest in their class.

Expanding ECEC is a more equitable response than flexible entry rules

International evidence suggests that flexible entry is disproportionately used by more advantaged families, potentially widening inequalities (Cavallo et al. 2026). The present study points to an alternative: expanding access to early childhood education reduces the August-September gap without modifying the cut-off, and the benefits go primarily to children from disadvantaged backgrounds.

Account for relative age in teacher assessments in the early cycles

Decisions about whether to hold a child back are based on teachers' assessments of readiness and ability. Children born in August are far more likely to be held back than those born in September. Assessment practices should explicitly account for month of birth, particularly in early years when maturity differences are greatest. Similar considerations apply at the end of primary school, when children are sorted into streams that determine their future educational and labour market prospects. To ensure that these decisions reflect underlying ability rather than relative age, clearer guidance is required to distinguish between maturity-related from ability-related difficulties. The disadvantage is strongest for children born just before the school-entry cut-off date and smaller for those born later in the cohort. Support should therefore prioritise the youngest children within each cohort through targeted measures, such as structured homework support or tutoring, to help close early learning gaps and reduce the likelihood of grade repetition.

References

Albanese, A. and Bousselin, A. (2026). Early Childhood Investments and the School-Entry Age Penalty: Evidence from Linked Administrative Data. Forthcoming IZA Discussion Paper.

Bedard, K. and Dhuey, E. (2006). The Persistence of Early Childhood Maturity: International Evidence of Long-Run Age Effects. Quarterly Journal of Economics, 121(4), 1437–1472.

Cavallo, M., Dhuey, E., Fumarco, L., Halewyck, L. and ter Meulen, S. (2026). The Economics of Age at School Entry: Insights from Evidence and Methods. CESifo Working Paper No. 12545.

Dustmann, C., Puhani, P. A. and Schönberg, U. (2017). The Long-Term Effects of Early Track Choice. The Economic Journal, 127(603), 1348–1380.

Elder, T. E. (2010). The Importance of Relative Standards in ADHD Diagnoses: Evidence Based on Exact Birth Dates. Journal of Health Economics, 29(5), 641–656.

Elder, T. E. and Lubotsky, D. H. (2009). Kindergarten entrance age and children's achievement: Impacts of state policies, family background, and peers. Journal of Human Resources, 44(3), 641–683.

Fredriksson, P. and Öckert, B. (2014). Life-Cycle Effects of Age at School Start. Economic Journal, 124(579), 977–1004.

Givord, P. (2024). How Age at School Entry Affects Future Educational and Socio-Emotional Outcomes: Evidence from PISA 2021. INSEE Working Papers 2024-18, Institut National de la Statistique et des Études Économiques.

Hornung, C., Kaufmann, L. M., Ottenbacher, M., Weth, C., Wollschläger, R., Ugen, S. and Fischbach, A. (2023). Early Childhood Education and Care in Luxembourg: Attendance and Associations with Early Learning Performance. Technical Report, Luxembourg Centre for Educational Testing (LUCET), Esch-sur-Alzette.

Morrow, R. L., Garland, E. J., Wright, J. M., Maclure, M., Taylor, S. and Dormuth, C. R. (2012). Influence of Relative Age on Diagnosis and Treatment of Attention-Deficit/Hyperactivity Disorder in Children. Journal of Health Economics, 31(3), 488–502.

OECD (2023). Education at a Glance 2023: OECD Indicators. Paris: OECD Publishing.

Puhani, P. A., Weber, A.M. (2007). Persistence of the School Entry Age Effect in a System of Flexible Tracking, IZA Discussion Papers 2965, IZA Network @ LISER.

Schneeweis, N. and Zweimüller, M. (2014). Early Tracking and the Misfortune of Being Young. Scandinavian Journal of Economics, 116(2), 394–428.

The authors

Andrea Albanese is a researcher scientist in the Labour Market department at LISER. He is also a research fellow at IZA@LISER and GLO. He completed a joint PhD programme at DEFAP Graduate School of Milan (Italy) and Ghent University (Belgium). His research focuses on labour economics, causal analysis, policy evaluation, and applied microeconometrics.

Email: andrea.albanese@liser.lu

Audrey Bousselin is a research associate in the Living Conditions department at LISER and an affiliate of the Los Angeles Behavioral Economics Laboratory (LABEL) and INED (French Institute for Demographic Studies). She holds a PhD in Economics from Beta-University of Nancy 2 (France). Her research focuses on family economics, policy evaluation, and early childhood education and care, with an emphasis on children's well-being and socio-emotional development.

Email: audrey.bousselin@liser.lu

Acknowlegment

This research was supported by the Luxembourg National Research Fund (FNR) under the project Childev: Investigating the consequences of public investments in early childhood education and care services for the quality of provision and child development (C21/SC/16307947).

Luxembourg National Research Fund

Publisher: LISER
Series: Policy Brief
e-ISSN: 2716-7437

Photo credits: Cover © Goodboy Picture Company / iStock - Réf : 2014779343

To cite this brief: Albanese, A., Bousselin, A. (2026, Apr). Closing the school-entry age gap in Luxembourg through early childhood education. LISER Policy Brief; 2026-07, 8p.