

Disadvantaged by Chance: Date of Birth, Relative Age in School and Educational Achievement

Robin Benz & Tobias Ackermann, University of Bern, Interfaculty Centre for Educational Research

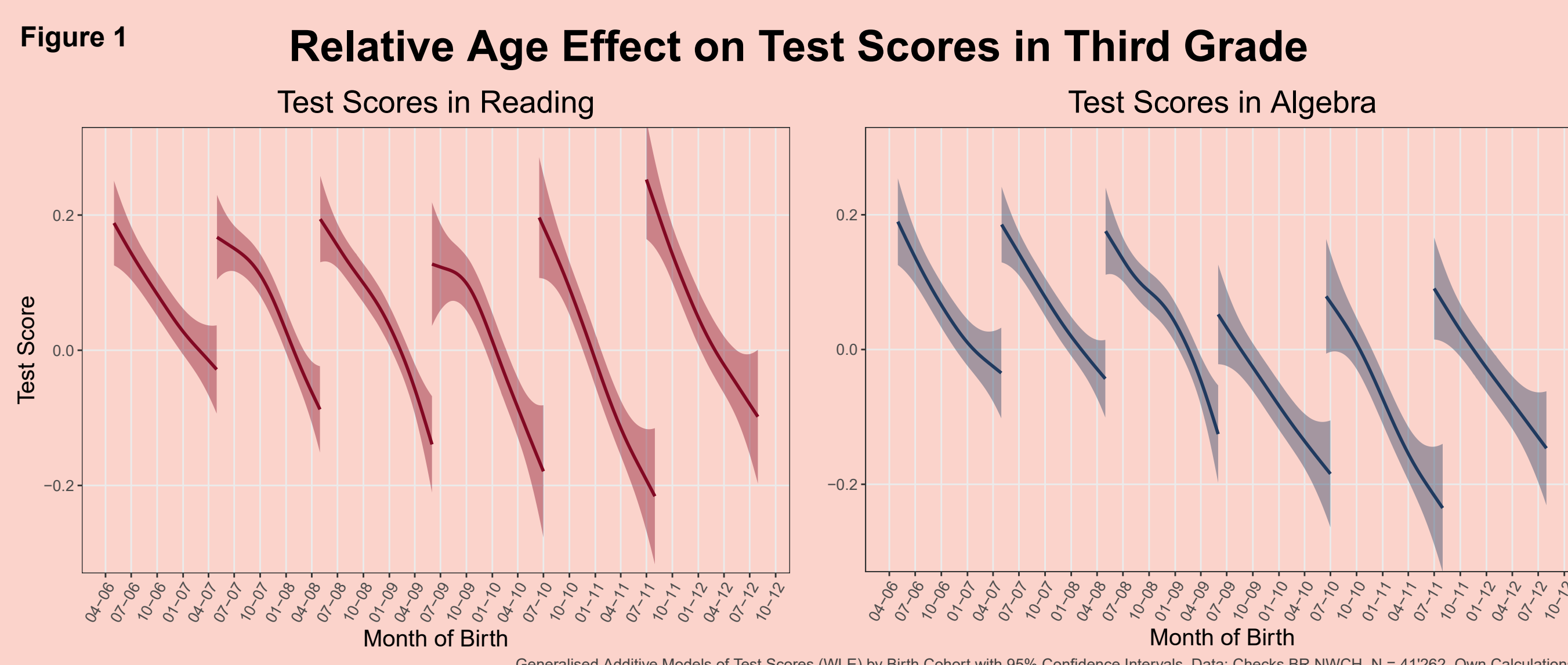
Background

Arbitrarily chosen cut-off dates for school enrolment may contribute to the emergence of early gaps in educational performance as they create age differences of up to a year within a cohort of pupils.

Previous research has consistently shown that the youngest in a cohort fall behind their relatively older peers.^{1,2} These performance gaps are known as **relative age effects** and are often embedded in theories of cumulative (dis-)advantage.³

Persistent Relative Age Effects?

Relative age effects on educational performance are also observable in the Swiss education system. Third grade pupils who entered school relatively old outperform their younger peers (Figure 1).



Evidence on the long-term implications of relative age effects in education is mixed.^{2,4} **This study examines the persistence of relative age effects throughout compulsory school in Switzerland.**

Data and Methods

This study draws on test score data encompassing the entire student population of Northwestern Switzerland (AG, BL, BS, SO). The **Checks BR NWCH** are administered annually in different grades, measuring pupils' competences in several subjects.⁵ The data **was linked with administrative records** to obtain information on pupil characteristics.

In presence of grade retention (or skipping) and late (or early) school enrolment, OLS yields biased estimates.¹ Two complementary empirical strategies are employed to resolve this problem:

Regression Discontinuity Design

- Exploiting **random variation in age caused by the cut-off date** for school enrolment.
- Comparing pupils whose birthday lies right after the cut-off date to those whose birthday lies right before the cut-off date (sharp design).
- Sample is restricted to pupils who enrolled on time with linear school careers.

Instrumental Variable Approach

- Accounting for confounding unobservables by using **assigned relative age as an instrument for pupils' actual relative age** at school enrolment.
- Assigned relative age refers to the age pupils would have in absence of late (or early) enrolment and grade retention (or skipping).

References and Contact Information

References:

- 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.
- Peña, P. A. (2017). Creating winners and losers: Date of birth, relative age in school, and outcomes in childhood and adulthood. *Economics of Education Review*, 56, 152–176.
- Hancock, D. J., Adler, A. L. & Côté, J. (2013). A proposed theoretical model to explain relative age effects in sport. *European Journal of Sport Science*, 13(6), 630–637.
- Nam, K. (2014). Until when does the effect of age on academic achievement persist? Evidence from Korean data. *Economics of Education Review*, 40, 106–122.
- BR NWCH. (2021). *Checks in BR NWCH 2013–2020* [Dataset]. University of Zurich, Institute for Educational Evaluation. Distributed by FORS, Lausanne. <https://doi.org/10.23662/FORS-D5-1261-1>.

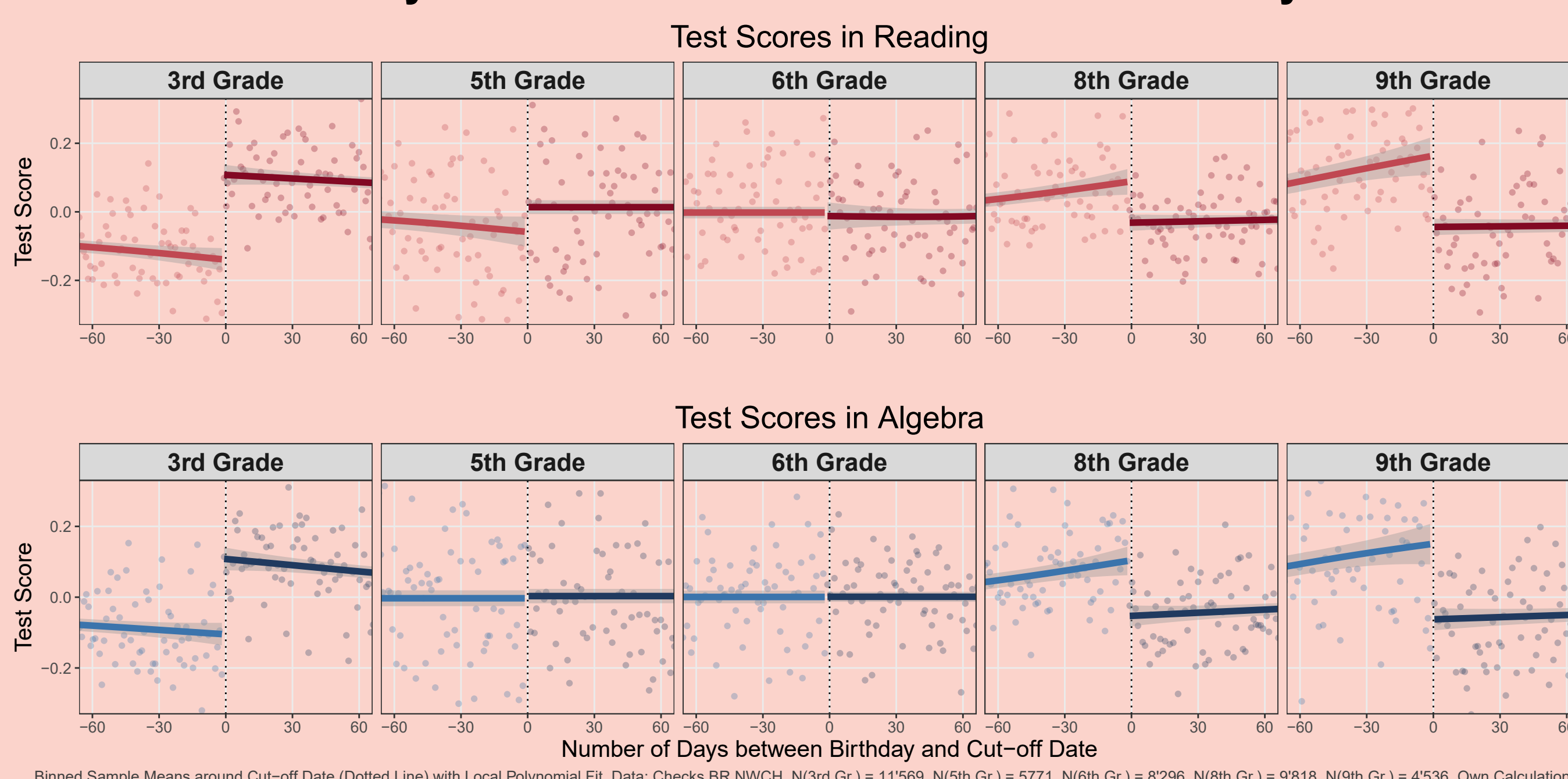
Contact: robin.benz@unibe.ch, tobias.ackermann@unibe.ch

This work was supported by the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101004392 (PIONEERED). For more information on the PIONEERED project, see www.pioneerproject.eu.

Regression Discontinuity Estimates

The **discontinuity in test scores around the cut-off date shifts the more pupils proceed through compulsory education** (Figure 2).

Figure 2 Discontinuity in Test Scores around the Cut-off Date by Grade

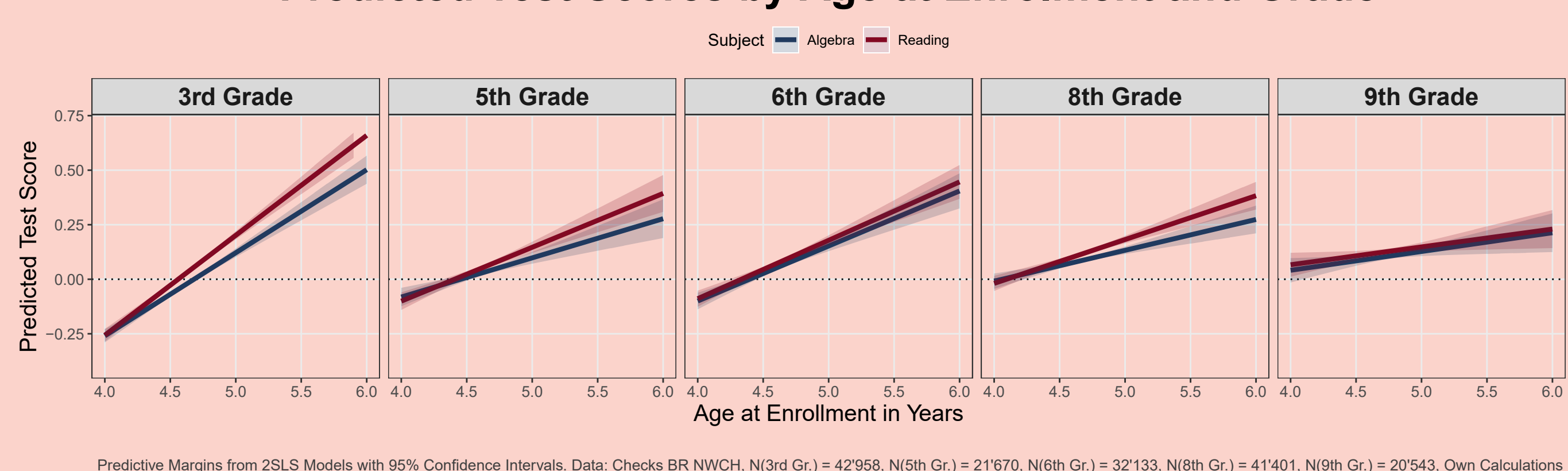


- The relative age advantages of older pupils diminish over the course of compulsory education - and even reverses in lower secondary education (Figure 4).
- Relatively young pupils are either able to catch up to their older peers over time or the estimates are biased by unobserved processes that systematically induce selectivity around the cut-off date, such as grade retention.

Instrumental Variable Estimates

These estimates indicate that the **advantages of relatively older pupils persist into lower secondary education** (Figure 3).

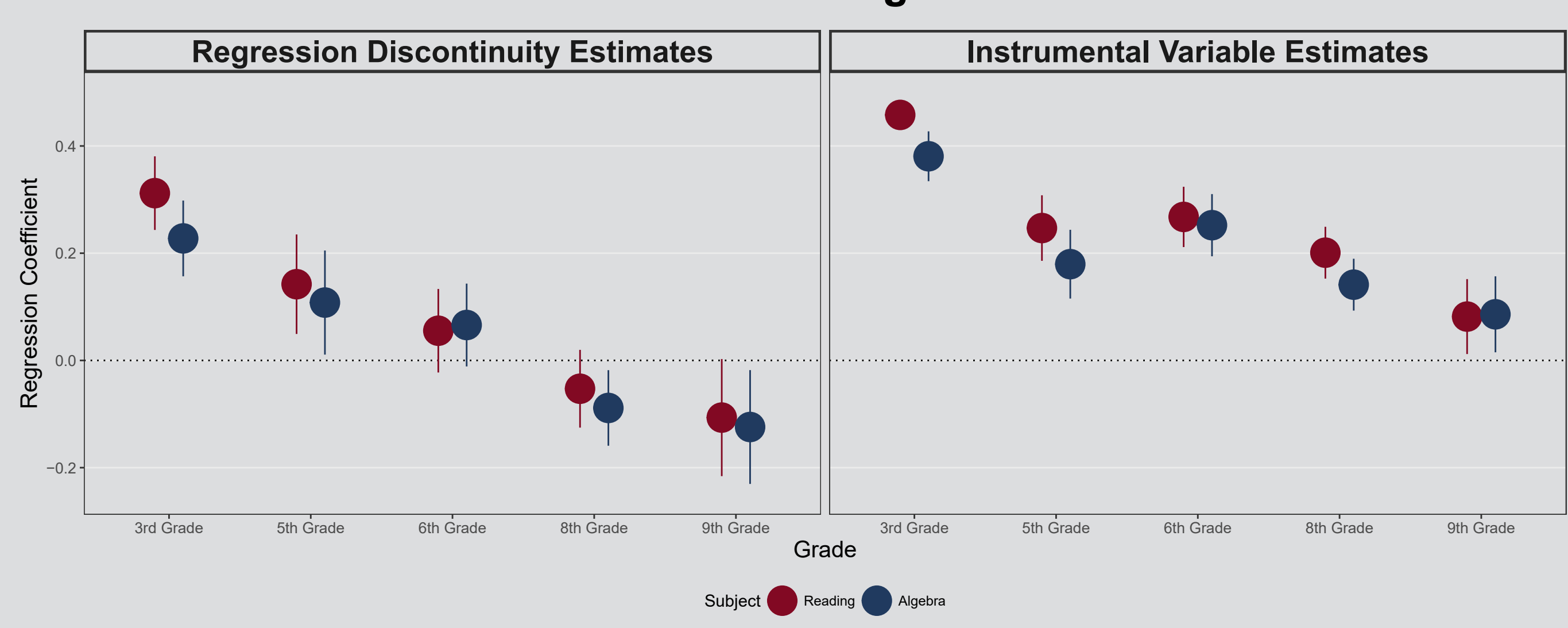
Figure 3 Predicted Test Scores by Age at Enrolment and Grade



- Relative age effects decrease over time and vanish only in ninth grade.
- The greater temporal persistence of relative age effects using an instrumental variable approach implies that pupils who entered school relatively young are less able to sustain a linear school career (Figure 4).

Discussion

Figure 4 Estimates of Relative Age across Grades



Both empirical approaches suggest that **relative age effects diminish throughout compulsory education. While time spent in school counteracts initial age-related disparities in educational performance, it likely does so too slowly.** Efforts to mitigate relative age effects should be taken at early stages of compulsory school.