

Learning inequality during the COVID-19 pandemic

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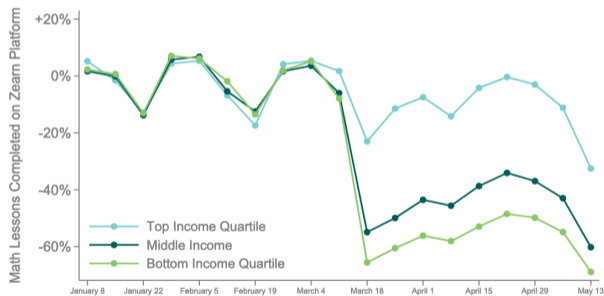
Motivation

- ▶ School closures during the COVID-19 pandemic have led to losses in instruction time for students, and concerns about increased inequality in learning
- ▶ Largest disruption to education in history, with 95% of the world's school population affected (United Nations 2020)
- ▶ So far, data to study the consequences of school closures have been limited
- ▶ In this paper, we evaluate the effect of the pandemic on primary school students in the Netherlands, where schools were forced to close for 8 weeks

Previous research

Chetty, Friedman, Hendren & Stepner (2020). Dashboard and NBER Working Paper.

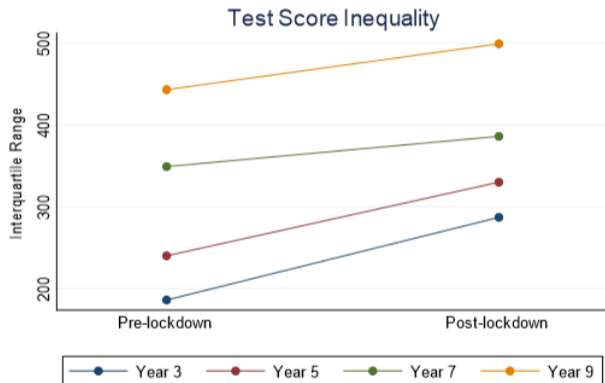
Effects of COVID on Educational Progress by Income Group



Previous research

Chetty, Friedman, Hendren & Stepner (2020). Dashboard and NBER Working Paper.

DELVE Initiative (2020).
“Balancing the Risks of Pupils Returning to Schools,” Royal Society Report.



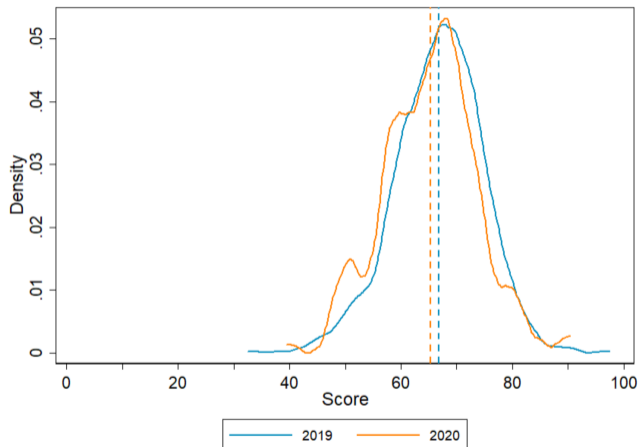
Sample restricted to pupils with BOTH 1 or 2 tests before AND 1 or 2 tests after
Yr3, 2.0k obs; Yr5, 3.9k; Yr7, 24.2k; Yr9, 8.6k
Source: Star test data from Renaissance

Previous research

Chetty, Friedman, Hendren & Stepner (2020). Dashboard and NBER Working Paper.

DELVE Initiative (2020).
“Balancing the Risks of Pupils Returning to Schools,” Royal Society Report.

Maldonado & De Witte (2020).
“The Effect of School Closures on Standardised Student Test Outcomes,” Working Paper.



This paper

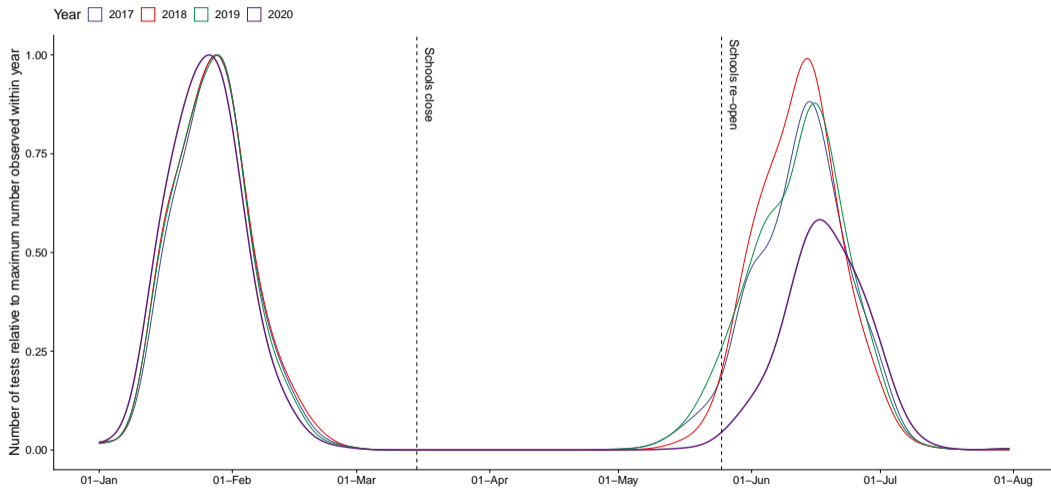
Data

- ▶ Representative 15% sample of all primary schools in the Netherlands
- ▶ Nationally standardized tests taken twice a year, in 2020 just before and after school closures
- ▶ Maths & Arithmetics, Spelling, Reading Comprehension

Identification

- ▶ Differences-in-differences design comparing progress during this period to that of students in the 3 years prior to the pandemic
- ▶ Rich set of covariates allows us to study heterogeneity (e.g., by SES) and implement various bias corrections
- ▶ Regression adjustment, propensity score weighting, maximum entropy balancing, within-school comparison, within-family comparison

Timeline



Baseline specification

Compare achievement pre- and post-lockdown:

$$\Delta y_i^{2020} = y_i^{2020,post} - y_i^{2020,pre}$$

Do the same for 3 previous years, $control \in \{2017, 2018, 2019\}$:

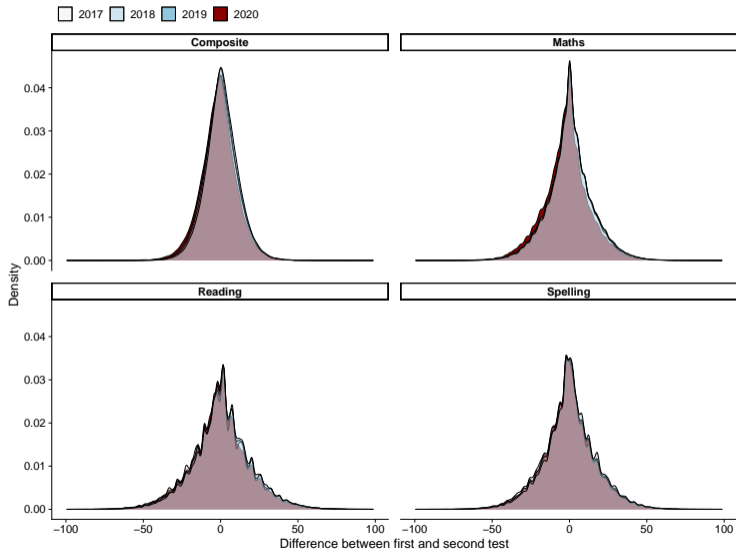
$$\Delta y_i^{control} = y_i^{control,post} - y_i^{control,pre}$$

Regress with an indicator T_i for treatment year:

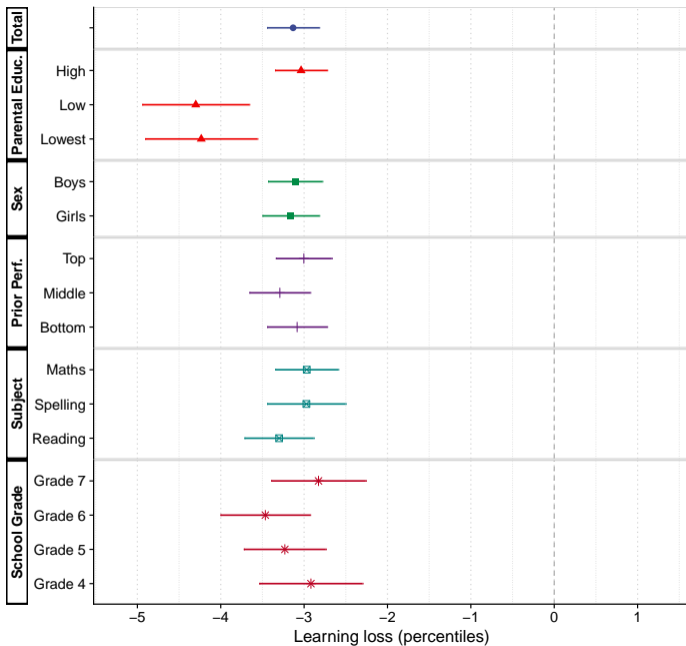
$$\Delta y_i = \beta_0 + \mathbf{X}'_i \gamma + \beta_1 T_i + \epsilon_i$$

In our baseline specification, $\mathbf{X}'_i \gamma$ includes time elapsed between testing dates and a linear trend in year. All standard errors are clustered at the school level.

Raw difference



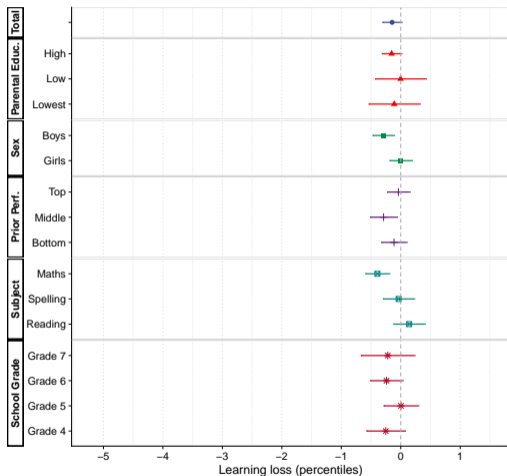
Main results



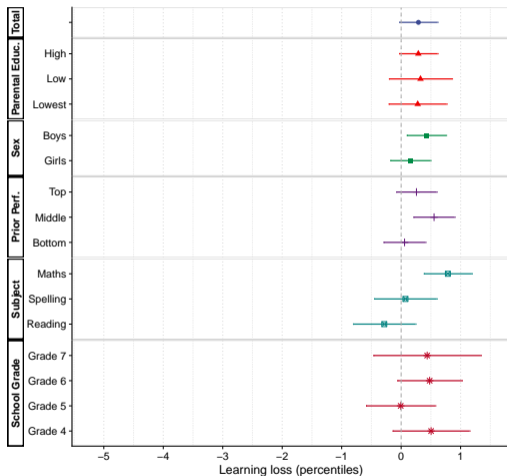
Main results

- ▶ Students lost on average 3 percentile points in the national distribution relative to a normal year. Equivalent to $\sim 8\%$ of a standard deviation
- ▶ Losses concentrated among students from less-educated homes. In the two lowest categories of parental education, effects 35–40% larger
- ▶ Results confirm worries about the uneven toll of COVID-19 on children and families
- ▶ In contrast, no marked differences by student gender, school grade, subject domain, or prior performance

Placebo analysis



(a) 2018 as treatment year



(b) 2019 as treatment year

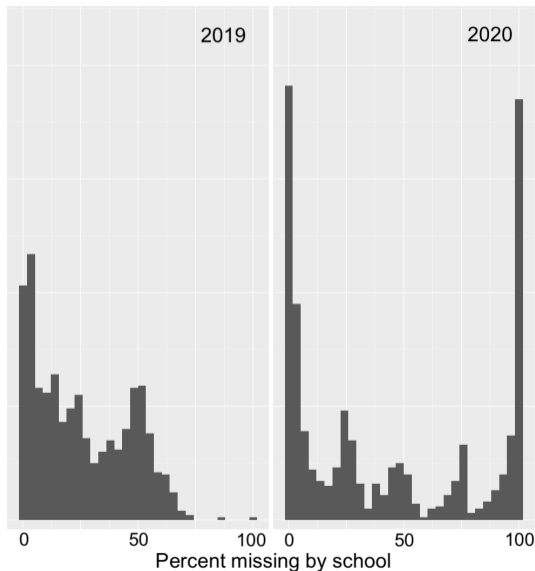
Sample attrition

We address this by:

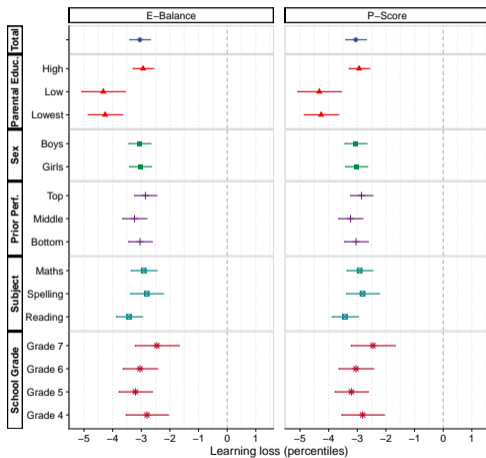
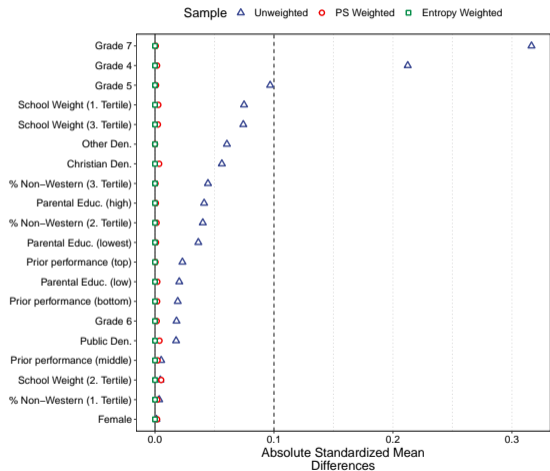
- ▶ Only schools that test $\geq 75\%$
- ▶ Regression adjustment
- ▶ Propensity score weighting
- ▶ Entropy balancing
- ▶ School fixed effects
- ▶ Sibling fixed effects

Controls: parental education, student sex, prior performance, school-level economic disadvantage, proportion immigrant background, school denomination

Results near identical across methods, somewhat larger with sibling fixed effects



Covariate balancing



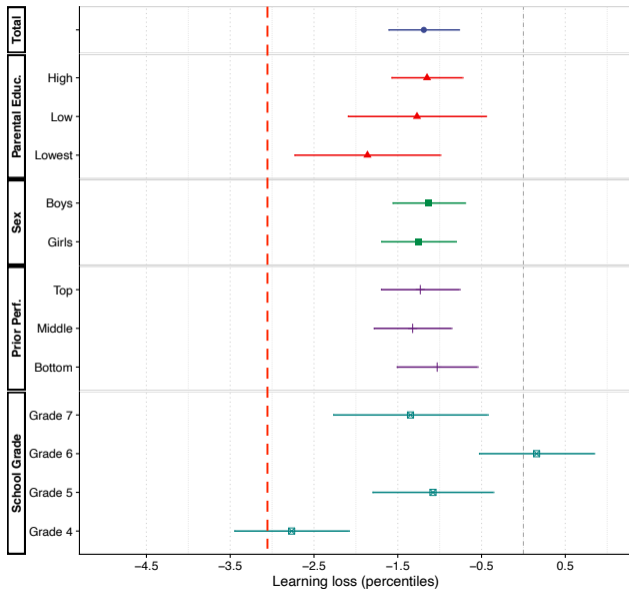
Mechanisms

Test scores could decline through two channels: knowledge learned or test taking skills

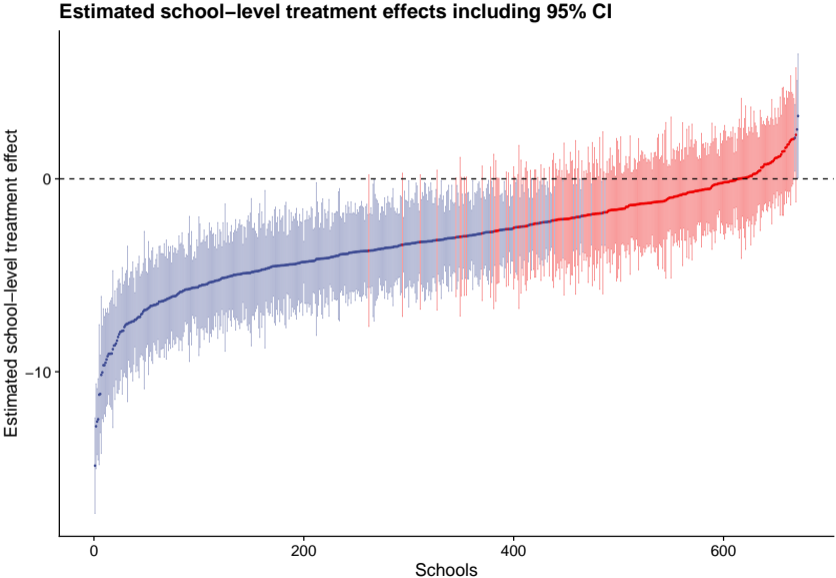
If remote instruction puts less emphasis on test taking, results would decline even if knowledge remained stable

We inspect performance on “information processing” tasks not designed to test curricular content

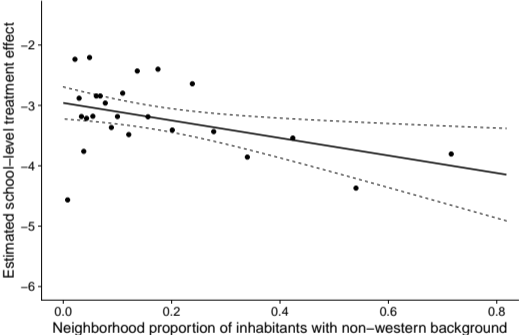
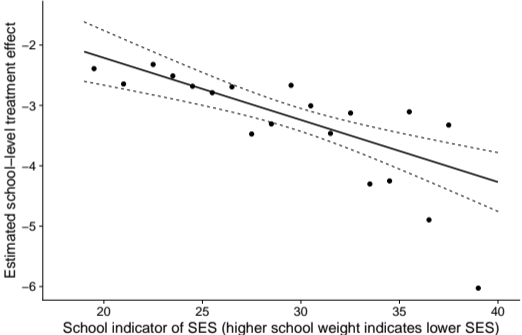
Effects shrink by on average 60%, implying knowledge learned is the main channel



School-level variation



School-level predictors



How representative is NL?

Close to OECD average in school spending and many student outcomes. However, unusually well prepared in most other respects. . .

- ▶ Highest rate of broadband adoption in Europe: more than 90% even among the poorest quartile of households
- ▶ Short lockdown compared to countries where schools stayed closed throughout summer (UK, US, Canada, Italy, Mexico, Chile, Turkey. . .)
- ▶ Pandemic's initial toll on lives and livelihoods milder than in many other countries
- ▶ Policy response: in March 2020, Ministry of Education devoted €2.5m for remote learning devices to students, another €3.8m in June 2020

Are effects large or small?

Many projections have been made: Azevedo et al. (World Bank), Dorn et al. (McKinsey), Kaffenberger (Oxford), Kuhfeld et al. (NWEA), Di Pietro et al. (EU Commission Joint Research Centre), Psacharopoulos et al. (World Bank)

Our results ($\sim 8\%$ of a SD) fall short of the more dramatic ones but are remarkably close to “best-case” scenarios from the EU Commission and the World Bank

- ▶ EU Commission lower bound of 0.008 SD per week \times 8 weeks = 0.064 SD (Di Pietro et al. 2020)
- ▶ World Bank projects a 0.060 SD loss with schools at 60% efficiency for 3 months (Azevedo et al. 2020)
- ▶ Also close in absolute size to impact of rigorous large-scale interventions (Lortie-Forgues & Inglis 2019)

Conclusions

- ▶ Students lost on average 3 percentile points in the national distribution relative to a normal year. Equivalent to $\sim 8\%$ of a standard deviation
- ▶ Losses concentrated among students from less-educated homes. In the two lowest categories of parental education, effects 35–40% larger
- ▶ Results are on same order of magnitude as best-case projections from EU and World Bank, suggesting losses many times larger in countries less prepared

Results likely a lower bound, not only for other countries but also within Netherlands

- ▶ Schools remained at reduced capacity following reopenings
- ▶ Dynamic models show that small initial losses can accumulate into larger ones
- ▶ Test scores are a narrow metric that does not consider children's psycho-social development, neither economic costs to parents and society

Overall, our results highlight the importance of social investment strategies to “build back better” and enhance resilience and equity

Thank you!

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