The Effects of Reducing Parent-Child Information Asymmetries on Students' Academic Performance: Evidence from a Field Experiment

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Abstract

Information asymmetries between parents and children and lack of communication between schools and parents often create obstacles to parental involvement in children's education. This paper addresses two specific questions:

(1) What is the effect of reducing information asymmetries on students' performance?

(2) What is the mechanism that drives parents' and students' behavioral change?

A school in Shenzhen, China, provided relevant data. Parents of a sample of 250 students were selected to receive information (both good news and bad news) about students' performance at school. Teachers of the treatment group sent a message about students' behavior at school to their parents every two weeks. The experiment continued for two semesters since the spring of 2019, and stopped in the spring of 2020 due to COVID-19. The Difference in Differences estimation method is used to evaluate the effects of the treatment. The results, however, are contrary to expectations and the literature: providing more feedback to parents is associated with lower test scores. "Upward belief bias" (parents having unrealistically favorable beliefs about their children's behavior at school) appears to explain this counterintuitive result. This result also adds to the literature of "good news-bad news" asymmetry with new supporting evidence from the perspective of economics of education.

Data

- End-of- semester test scores, in four subjects (Chinese, English, Math, and Science) for all students in both the treatment and control groups.
- Parents' prior beliefs about their children's performance at school.

Empirical Methods

Identifying the Treatment Effect

$$\text{SD\_Score}_{ijkst} = \alpha_i + \sum_s \alpha_s \,\text{Subject}_s + \beta\, \text{DiD}_{jt} + \gamma\, \text{Subject}_m \times \text{DiD}_{jt} + \sum_t \delta_t\, \text{Sems}_t + \epsilon_{ijkst}. \tag{1}$$

- SD_Score_{ijkst} is the standardized score of student i in class j grade k and on subject s in semester t;
- $\text{DiD}_{jt} = \text{Treatment}_j \times \text{T-time}$ ('T-time' is a dummy variable indicating the treatment semesters);
- 'Sems_t' stands for the semester dummies (being controlled for the time fixed effect);
- Subject_m denotes the subject taught by the class masters.

Heterogeneous Effect on Each Grade

$$\begin{aligned}\text{SD\_Score}_{ijkst} =& \alpha_i + \beta\, \text{DiD}_{jt} + \sum_s \alpha_s \,\text{Subject}_s + \sum_s \beta_s \,\text{Subject}_s \times \text{DiD}_{jt} \\ &+ \sum_k \beta_k\, \text{Grade}_k \times \text{DiD}_{jt} + \sum_k \sum_s \beta_{ks}\, \text{Subject}_s \times \text{Grade}_k \\ &+ \sum_k \sum_s \gamma_{ks}\, \text{Subject}_s \times \text{Grade}_k \times \text{DiD}_{jt} + \sum_t \delta_t\, \text{Sems}_t + \epsilon_{ijkst}.\end{aligned} \tag{2}$$

Parallel Trend Test

$$\begin{aligned}\text{SD\_Score}_{ijkst} = \theta_j + \sum_s \alpha_s \,\text{Subject}_s + \sum_t \beta_t\, \text{Sems}_t \times \text{Treatment}_j \\ + \sum_t \delta_t\, \text{Sems}_t + \epsilon_{ijkst},\end{aligned} \tag{3}$$

- Sems_t is the semester dummy;
- θ_j denotes the class level fixed effects;
- the interaction of Sems_t and Treatment_j measures the difference between the treatment and control group in each semester.

Belief Bias

$$\text{SD\_Score}_{ijks4\&5} = \sum_s \beta_s \,\text{Subject}_s + \sum_n \gamma_n\, \text{Belief Bias}_n + \delta\, \text{Avg\_Score}_{ijks} + \epsilon_{ijks}, \tag{4}$$

- Belief Bias_n is a list of dummy variables representing parents' belief biases, e.g., "AB" means parent expectation is A, but student actual performance is B.
- $\text{Avg\_Score}_{ijks} = \frac{\sum_{t=1}^{3} \text{SD\_Score}_{ijkst}}{3}$ is the average of the pretreatment scores.

Propensity Score Matching Method (Score Difference)

$$\text{Score Difference} = \sum_s \beta_s \,\text{Subject}_s + \sum_n \gamma_n\, \text{Belief Bias}_n + \delta\, \text{Avg\_Score}_{ijks} + \epsilon_{ijks}, \tag{5}$$

Main Results

Table 1: The Impact of the Treatment: DiD Aggregate

	(1) SD_Scores	(2) SD_Scores	(3) SD_Scores
DiD	-0.109^{***}	-0.108^{***}	-0.121^{***}
	(0.032)	(0.029)	(0.031)
$\text{Subject}_m \times$ DiD			0.051
			(0.035)
Individual FE	No	Yes	Yes
Class FE	Yes	No	No
Subject FE	Yes	Yes	Yes
Semester FE	Yes	Yes	Yes
N	20240	20240	20240
R^2	0.01466	0.00122	0.00135

Notes: Subject_m is a dummy variable that indicates the subjects taught by the class master. The treatment effect on class masters' subjects is -0.07, which is negative and significant (p-value is 0.06). Robust standard errors instead of clustered standard errors are given in parentheses, because the number of clusters (classes) is only 25, which is not big enough to give sound clustered standard errors.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

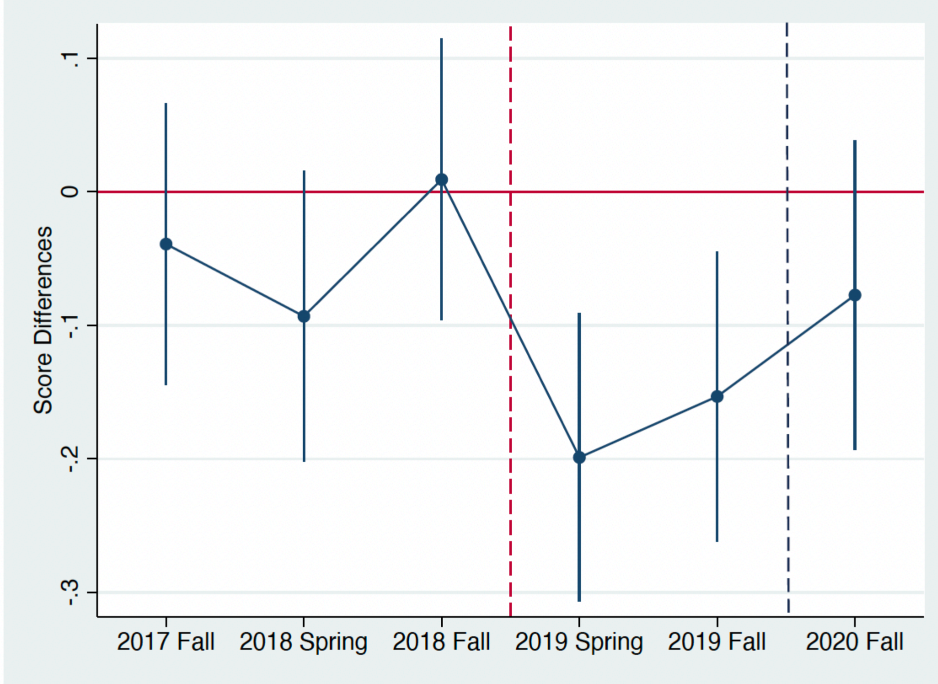

Figure 1: Parallel Trend Test

Notes: These graphs display the coefficient values β_t of the interaction term between treatment and Semesters in equation (3), and the confidence intervals at 95 percent significance level are displayed using the vertical blue lines that go through the point estimates. 2019 Spring and 2019 Fall are the two semesters when the experiment was active.

Conclusions

- Information provision might not be helpful for student academic performance, especially elementary school students. Future programs must be careful about implementing an information provision regime of this kind.
- Upward-biased beliefs ("AB" and "AC") and correct but bad beliefs ("BB" and "CC") cause significantly negative impact.
- Downward-biased beliefs ("BA" and "CA") and correct but good beliefs ("AA") have insignificant effect on scores.
- More potential explanation behind this negative result and ideas for future research:

1. Too much intervention could be counter-effective, especially for elementary education;
2. Elementary school students might not be mature enough to internalize the rewards and punishment;
3. Their parents might be relatively short-sighted when given too much feedback.

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