

Adaptability and Rural-Urban Educational Inequality:

Evidence from the COVID-19

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Abstract

This paper estimates the impact of adaptability on educational inequality between urban and rural students by leveraging the sudden and exogenous shock of the COVID-19 in China. Using a unique administrative dataset covering one city's NCEE (National College Entrance Exam, the sole determinant of university admission) and HSEE (High School Entrance Exam, almost the sole determinant of high school admission) participants from 2014 to 2023 and employing a difference-in-differences strategy, we find that the COVID-19 significantly widened the gap between urban and rural students in HSEE scores, subject-specific scores, and the probabilities of admission to regular high school. Our back-of-the-envelope calculations indicate that, more than 12.3% rural students lost the opportunity to enter high school, leading to substantial future income losses and widening the rural-urban gap in human capital. However, the pandemic did not affect admission opportunities to elite high schools, and for students in these schools, the gap in NCEE scores between urban and rural students significantly narrowed after the pandemic. The results of the mechanism and qualitative analysis suggest that this may be because rural students attending elite high schools (most of whom reside on campus) experienced less social disruption during lockdowns and showed greater adaptability to the pandemic (e.g., better time management). However, the gap in adaptability between urban and rural households had a greater impact on the educational outcomes of junior high school students (e.g., differences in spending on tutoring classes).

Motivation

- Previous studies have mainly utilized variations in the severity of the COVID or the intensity of lockdowns between different regions to identify the impact of pandemic.
- Few studies have identified the role of adaptability in the face of unexpected events as a determinant of educational inequality, likely due to the rarity of exogenous shocks.
- Limited studies have used the standardized NCEE or HSEE scores to reflect the actual consequence of educational inequality in China.

The impact of the pandemic or lockdown measures on urban and rural students within the same region is assumed to be similar. By further controlling for school fixed effects and students' initial abilities, any differences in the trends of academic performance and educational opportunities between urban and rural students within the same region before and after the pandemic could be attributed to differences in their ADAPABILITY.

Data Sources

1. Administrative Education Dataset:

- A representative county-level city in Shandong Province
- HSEE score, ranking, and score of each subject of all of the 21393 students from all of the 27 junior high school in 2017, 2018, 2019, and 2020
- NCEE score, enrolled college, and corresponding HSEE scores from 3 years ago of all of the 2475 students from the elite high school in 2014/2017/2020/2023
- A repeated cross-sectional dataset

2. China Family Panel Studies (CFPS):

- 3044 primary and secondary students from a panel dataset in 2014, 2016, 2018, and 2020

Identification Strategy

Difference-in-Differences and Event Study specification:

$$Y_{sit} = \beta_0 + \beta_1 Urban_s \cdot Covid_t + \beta_2 Ability_i + \theta_s + \gamma_t + \varepsilon_{sit}$$

$$Y_{sit} = \beta_0 + \beta_k \sum_{k \geq -3}^0 D_{t,0+k} + \theta_s + \gamma_t + \varepsilon_{sit}$$

where Y_{sit} represent the educational outcome (e.g., HSEE or NCEE score or ranking) of student i in school s in year t . $Urban_s$ is a dummy that represents the urban school, and $Covid_t$ is a dummy that indicates the post-covid period. θ_s is school FE, and γ_t is year FE. β_1 reflects the changes in the gap in NCEE and HSEE scores between rural and urban students before and after the pandemic. $D_{t,0+k}$ represents a series of dummies that indicates the 3 years, 2 years, 1 year and current year prior to the outbreak of the pandemic.

Conclusion

- The pandemic has significantly exacerbated educational inequality between urban and rural junior high school students, affecting their HSEE scores, subject-specific scores, and the probabilities of admission to regular high school.
- For students in elite high schools, the gap in NCEE scores between urban and rural students has significantly narrowed after the epidemic.
- The differences in adaptability could explain the differences in educational performance. On the one hand, rural students in elite high schools show greater adaptability compared to their urban peers, dedicating more of their extracurricular time to studying. On the other hand, urban families demonstrate stronger adaptability in response to the pandemic, spending more on online tutoring for their children than rural families do.

Baseline Estimation: The Impact of COVID-19 on Rural-Urban Inequality in HSEE--Intensive Margin

	Log: Total Score		Log: Total Ranking		Total Ranking	
	(1)	(2)	(3)	(4)	(5)	(6)
Urban × Covid	0.120*** (0.033)	0.115*** (0.029)	0.291*** (0.082)	0.283*** (0.082)	470.472** (169.175)	414.641*** (127.678)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
School FE	Yes	Yes	Yes	Yes	Yes	Yes
Weight	No	Yes	No	Yes	No	Yes
Mean of the Dependent Variable	5.887	5.887	7.597	7.597	2772.564	2772.564
No. of Observations	21,393	21,393	21,393	21,393	21,393	21,393
Adjusted R-squared	0.073	0.047	0.085	0.077	0.179	0.159

Note: *** denotes significance at 1%, ** at 5%, and * at 10%. All observations are at the individual level. The dependent variable is the natural logarithm of total scores in HSEE and ranking. Urban is an indicator that equals one for individuals attending middle school in urban areas and zero for those in rural townships. The total sample consists of 21,393 observations in column(1)-column(5). Column (2), (4) and (5) control for year fixed effects and school fixed effects. The standard errors are reported in parentheses, clustered by school.

Baseline Estimation: The Impact of COVID-19 on Rural-Urban Inequality in admission--Entensive Margin

	High School(dummy)		Elite High School(dummy)	
	(1)	(2)	(3)	(4)
Urban × Covid	0.086** (0.032)	0.076*** (0.026)	-0.010 (0.029)	-0.028 (0.026)
Year FE	Yes	Yes	Yes	Yes
School FE	Yes	Yes	Yes	Yes
Weight	No	Yes	No	Yes
Mean of the Dependent Variable	0.544	0.544	0.199	0.199
No. of Observations	21,393	21,393	21,393	21,393
Adjusted R-squared	0.081	0.052	0.081	0.061

Note: *** denotes significance at 1%, ** at 5%, and * at 10%. All observations are at the individual level. The dependent variables are whether the scores in the High School Entrance Examination (HSEE) qualify for general high school admission and for key high school admission. Urban is an indicator that equals one for individuals attending middle school in urban areas and zero for those in rural townships. The total sample consists of 21,393 observations in column(1)-column(4). Column (2) and (4) control for year fixed effects and school fixed effects. The standard errors are reported in parentheses, clustered by school.

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