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School enrollments during the COVID-19 pandemic: The case of New York

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A B S T R A C T

This study extends the earlier literature on changes in school enrollment in the wake of the COVID-19 pandemic by using data for the second COVID-19 school year (2021–2022) from the state of New York. Contrary to expectations that the resumption of fully-live instruction would reverse the first COVID-19 year’s declines in public school enrollment, we find that enrollment continued to drop sharply in the second COVID-19 school year, when schools were entirely back to in-person learning. These declines in enrollment vary substantially by grade, race and poverty and are robust to controlling for other COVID-19 related factors. In addition, we find mixed results for the number of private school students but significant increases in home-schooled students in the two COVID-19 years. The findings have important educational and fiscal implications.

1. Introduction

The pervasive and disproportionate changes in school enrollment, particularly by grade, race and poverty, in the wake of the outbreak of COVID-19 in the U.S. have been widely documented (Chatterji and Li, 2021; Dee and Murphy, 2021; Musaddiq et al., 2021). The pandemic resulted in unprecedented disruptions in the short term, with districts shifting to remote and hybrid learning and witnessing decreases in enrollment, particularly in the early grades. However, all of the scholarly work in this area involves data from school year 2020–2021 (SY2021) and earlier. In this study we draw upon recently-released student enrollment data from New York State (NYS) to throw light upon enrollment changes in SY2022. NYS is an appealing state to study the impact of the COVID-19 pandemic on education enrollment for two major reasons. First, the state was the hardest hit in the country during the first wave of the pandemic, and partly as a result of that, many school districts did not return to full in-person instruction till SY2022. Second, NYS is a large and diverse state, with more than 700 independent school districts and with minority students accounting for a majority (55%) of the K–12 population. The NYS setting allows us to examine three research questions. First, did the return to fully in-person instruction in SY2022 witness a reversal in the pandemic-induced decline in public school enrollment? Second, how did changes in enrollment, if any, vary by grade and student characteristics, particularly race and poverty? Third, how did the numbers of private school and homeschool students change during the two pandemic years?

The onset of COVID-19 in the U.S. in spring 2020 set off widespread disruptions in the economy and society at large. Beginning mid-March, schools were quickly shut down across the country. In the first full year following the outbreak of COVID-19, many states registered dramatic decreases in public school enrollment. Hawaii, for example, witnessed a decline that was more than 10 times the highest annual change the state had experienced since 2016 (Murphy, 2021). Some of the decline was associated with instructional modality (Dee et al., 2021; Musaddiq et al., 2021). However, while these papers have advanced our understanding of school enrollment trends in the early stage of the COVID-19 pandemic, there is, to our knowledge, no rigorous study thus far that employs SY2022 data. This paper fills this important gap.

We find that the resumption of in-person instruction in SY2022 across NYS did not reverse the large enrollment declines that these public school districts had faced in the previous COVID-19 year. In fact, the decreases in student counts in many grades were even higher in SY2022 than in SY2021. We find evidence of significant heterogeneity: enrollment declines are most salient in elementary grades, among White students, and among urban high-needs districts. Finally, the state also witnessed increases in home-schooled students in the COVID-19 years, though the evidence for enrollment gains in private schools is mixed.
2. Analytical strategy and data

To answer the research questions, we run event-study models which delineate the year-over-year changes in district enrollment, conditional on district fixed effects as well as prior grade enrollment. The regression takes the following specification

\[
E_{gdt} = \sum_{k=17}^{19} \beta_k Y_{kt} + \alpha_1 Y_{21t} + \alpha_2 Y_{22t} + \theta E_{(g-2)dt} + \pi_t + \epsilon_{gdt},
\]

where \(E_{gdt}\) refers to student enrollment in grade \(g\) in district \(d\) in year \(t\); \(\pi\) represents school district fixed effects; and \(\epsilon\) is an error term. Year dummies, \(Y\)'s, are included from SY2017 \((Y_{17})\) to SY2022 \((Y_{22})\), with the last pre-COVID SY2020 serving as the omitted category. To account for any changes in cohort size across successive cohorts, we control for two-year lagged enrollment, \(E_{(g-2)dt}\); for example, regressions for grade 10 control for enrollment in grade 8 two years ago within the same district. \(\)

We run the regressions separately by grade, as prior literature has documented the differential incidence of pandemic-induced enrollment declines across grades and levels. \(\)

The key coefficients of \(Y_{11}\) and \(Y_{22}\), \(\alpha_1\) and \(\alpha_2\), are of key interest and indicate how enrollments in these two COVID-19 years change in comparison to the reference SY2020.

Starting from the main grade-based regression in Eq. (1), we also ran additional regressions to see whether the effects of the pandemic on enrollment vary by race and by an official classification of school districts based on state-determined need/resource capacity (NRC) index: low NRC (low), average NRC (average), rural high NRC (rural), and urban/suburban high NRC districts (urban). \(\)

We also use Eq. (1) to estimate the effects of the pandemic on the numbers of private school and homeschool students. \(\)

Further, as a robustness check we include additional variables that are related more directly to the pandemic captured by vector \(X\) in Eq. (2). These variables embody three of these factors: learning modality (shares of within-district students learning virtually, in-person, or hybrid (i.e., a combination between virtual and in-person modes), parental loss of employment (proxied by unemployment rates), and fear of infection (proxied by COVID-19 cases and deaths).

\[
E_{gdt} = \sum_{k=17}^{19} \beta_k Y_{kt} + \alpha_1 Y_{21t} + \alpha_2 Y_{22t} + \theta E_{(g-2)dt} + \pi_t + \delta X_{dt} + \epsilon_{gdt},
\]

We compile data on student enrollment from the NYS Education Department. Enrollment is recorded on the Basic Education Data System (BEDS) day, which is the first Wednesday in October. Therefore, the enrollment for SY2020 was recorded in October 2019 before the start of the pandemic in March 2020 and can appropriately serve as the reference year in Eqs. (1) and (2). District variation in learning modes in SY2021 is captured through incorporating two percentage variables: shares of students in virtual and hybrid schooling, with shares of in-person students being the omitted category (these two variables are coded as 0 for all other years when 100% students are in-person). Data on unemployment rates, COVID-19 cases and death are available mostly at the county level. \(\)

The mean unemployment rate in 2020 (that affects enrollment in SY2021) soared to 8.2% while this rate ranges between 4% and 5% in other years (4% in SY2020). The mean COVID-19 cases and deaths are non-zero only in two COVID-19 years and capture the mean seven-day COVID-19 cases and deaths from July to the first Wednesday in October in two pandemic years per 1,000 in county enrollment. The new variables in \(X\) in addition to year dummies in Eq. (2) reflect the impact of the COVID-19 pandemic on enrollment.

3. Results

While Table A1 in the appendix provides summary statistics, Fig. 1 (with a corresponding Table A2 in the appendix) reports the results for our first research question using our basic specification (Eq. (1)). There are large, and statistically significant, declines in enrollment in elementary and middle school grades in both SY2021 and SY2022. The declines in grades 1, 6, 7 and 8 in SY2022 are also significantly higher in absolute value than those in SY2021. For example, compared to SY2020, the average district has a reduction of 3.8 and 8.3 students in grade 1 in SY2021 and SY2022, respectively. For high school grades, enrollment declines are statistically significant for grade 9 in 2021 and grades 10–11 in SY2022. Notably, the declines in SY2022 are even larger for all grades (except for grade 9). Overall, the table shows no evidence that the return to in-person schooling in SY2022 stemmed the move away from public schools that was evident in SY2021. \(\)

As for the second research question, we only include, for brevity, the results for White students in the main text in Table 1—results for the other races are reported in the appendix. As was the case with total enrollment, enrollment among White students experienced large and statistically significant declines in both SY2021 and SY2022 in elementary and middle school grades, particularly in grades 1 and 2. The high school enrollment decline patterns were relatively similar to those in Fig. 1, with enrollment unchanged for grade 12 in both COVID-19 years. Table 2 reports enrollment declines by NRC-based districts. We run the same grade-by-year regressions as before but with separate year dummies for each of the four district categories. The declines in enrollment were the largest for urban-high needs districts, especially in elementary school grades, in SY2021; the declines for this district group were even larger (and statistically significant) in SY2022 in most grades than those in SY2021.

Table 3 examines the robustness of our results when we bring in additional variables in \(X\) in Eq. (2) as previously described. Accounting for these potential determinants of student enrollment does not change the main message: the return to in-person schooling in SY2022 did not compensate for the previous

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1 The motivation for this control is that those students who had been enrolled in earlier grades in a district are more likely to enroll in the current grade. We use a two-year lagged enrollment so that SY2022 enrollment is predicated on SY2020 enrollment. Using a one-year lagged enrollment would have necessitated including SY2021 enrollment, which was already affected by the pandemic, as a control for SY2022 enrollment.

2 Kindergarten has not been mandatory in New York State till recently, so we restrict our analysis to grades 1 through 12.

3 The NRC is derived using the shares of free-or-reduced-price-lunch students and measures of fiscal capacity. More information can be found here: https://www.p12.nysed.gov/irs/accountability/2011-12/NeedResourceCapacityIndexpdf.pdf.

4 Parents were expected to know by spring 2021 that schools would be back for full in-person instruction for SY2022. In May 2021, NYS Governor Andrew Cuomo announced that schools would be fully in-person in SY2022 (Driffield and Doerr, 2021). This announcement was made early enough for families to decide whether to enroll their children in public schools in the fall or to seek alternate options (private and home schooling). Schools in NYS start their school year in September. Also, although there is no central database to record the in-person share of learning in private schools for New York, private schools are more likely to offer in-person learning than public schools (Kurmann and Lale, 2022).

5 Unemployment rates are available at the city level for cities with populations greater than 25,000. However, only 12.5% of school districts take city-level unemployment rates.

6 There is evidence of a pre-existing trend toward enrollment declines in the pre-COVID era; however, the declines in SY2021, and particularly in SY2022, are much steeper than those in pre-COVID years.
COVID-19 year's enrollment losses, particularly in early elementary and middle school grades, and enrollment losses may even have gotten worse.7

7 As expected, hybrid and virtual schooling negatively affected enrollment in SY2021 but this was mostly true only for elementary grades, probably a reflection of potential parental concerns over elementary children's ability to learn virtually. Note also that the coefficients on SY2021 are now positive in Table 3 as we include variables for hybrid and remote learning that accounted for the negative enrollment impacts.
Table 3
Return to in-person schooling and public school enrollment by grade— robustness checks (controlling for additional COVID-19 related factors)

| Grade | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| Y21  | -4.92 | -4.01 | -2.54 | -3.52 | -3.48 | -3.73 | -3.98 | -3.08 | 0.40 | -4.44 | -5.27 | -0.78 |
| Y22  | (1.37)** | (0.94)** | (0.73)** | (0.77)** | (0.84)** | (0.77)** | (0.84)** | (0.76)** | (1.29) | (1.57)** | (1.13)** | (1.16) |
| Y19  | 2.90 | 8.01 | 7.08 | 7.10 | 7.09 | 7.86 | 6.51 | 1.32 | 2.10 | 2.46 | 1.52 | 1.95 |
| Y17  | (1.37)** | (0.94)** | (0.73)** | (0.77)** | (0.84)** | (0.77)** | (0.84)** | (0.76)** | (1.29) | (1.57)** | (1.13)** | (1.16) |
| Y15  | 3.40 | 1.10 | 3.02 | 1.08 | 1.37 | 1.67 | 0.97 | 0.00 | 0.97 | 2.09 | 1.88 | 1.23 |
| Y13  | (1.02)** | (0.52)** | (0.43)** | (0.48)** | (0.45)** | (0.52)** | (0.49)** | (0.46)** | (1.06) | (0.57)** | (0.51)** | (0.80) |
| Y11  | 8.73 | 3.39 | 3.93 | 2.81 | 3.46 | 3.02 | 0.91 | 1.73 | 6.23 | 4.00 | -0.09 | 1.58 |
| Y9   | (2.12)** | (0.67)** | (0.71)** | (0.65)** | (0.84)** | (0.80)** | (0.67)** | (0.63)** | (3.34) | (1.47)** | (1.04) | (1.24) |
| Y7   | 9.21 | 3.11 | 2.74 | 1.45 | 2.98 | 1.98 | 0.95 | 1.50 | 5.68 | 3.17 | 0.47 | 0.82 |
| Y5   | (2.45)** | (0.73)** | (0.63)** | (0.74)** | (0.86)** | (0.80)** | (0.75)** | (0.78)** | (3.09) | (1.50)** | (1.04) | (1.20) |
| Y3   | Hybrid | -0.040 | -0.023 | -0.032 | -0.027 | -0.021 | -0.013 | -0.035 | -0.353 | 0.00624 | -0.00186 | -0.0106 |
| Y1   | Virtual | -0.104 | -0.036 | -0.030 | -0.055 | -0.037 | -0.042 | -0.0194 | -0.0100 | -0.0187 | 0.0199 | -0.040 | -0.0271 |
| Notes: All notes are the same as in Table 1. We do not conduct the post-regression equality tests for the coefficients of Y21 and Y22 because the two coefficients are not equally affected by additional controls.

Table 4
Enrollment in private schools and number of homeschooled students— county-level analyses.

| Home schooling | Primary | Secondary | County-level private school enrollment |
|----------------|---------|-----------|----------------------------------------|
| Key yrs.       |         |           |                                        |
| V22            | 19.63   | 10.19     |                                        |
| (1.33)**       | (0.80)**|           |                                        |
| V21            | 18.44   | 8.08      |                                        |
| (0.89)**       | (0.67)**|           |                                        |
| V19            | 5.15    | -3.49     |                                        |
| (0.38)**       | (0.32)**|           |                                        |
| V17            | -6.04   | -3.82     |                                        |
| (0.42)**       | (0.42)**|           |                                        |
| V15            | -6.16   | -4.62     |                                        |
| (0.52)**       | (0.42)**|           |                                        |
| # of obs       | 4318    | 4318      |                                        |

Notes: The estimates in columns 1 and 2 are at the school district level. Because the homeschoold data do not disaggregate by grades, we do not include E_{i,g}. as in Eq. (1) for columns 3–14. Grayed coefficients of Y22 are significantly different at least at the 0.05 level from the coefficients of V21. *p < 0.05, **p < 0.01.

Table 4 shows that there were large increases in both primary-grades and secondary-grades homeschooling in SY2021, which further crept up in SY2022. Relative to SY2020, the average school district has 18 and 19 additional primary grade students being homeschooled in SY2021 and SY2022, respectively. Contrary to homeschooling, the coefficients on private school enrollment are negative for almost all grades in SY2021. In SY2022, the coefficients are mixed: some are positive (grades 1, 2, 3, 6, 7, 8, and 9), and some are negative but to a lesser degree (grades 4, and 5) or to a greater degree (grades 10 and 12). None of the coefficients for COVID-19 years is statistically significant, though.

4. Conclusions

Conventional wisdom would have it that enrollment declines in the first full school-year (SY2021) following the COVID-19 outbreak were due to learning disruptions (for example, virtual or hybrid instructional modes) and especially, health concerns (as vaccines only became widely available in late 2020 and early 2021—months after the start of SY2021). The expectation was that students would flock back to public schools once things stabilized with availability of vaccines and resumption of full in-person schooling (Hollingsworth and Attanasio, 2021). We, however, find evidence that enrollment decreases in many grades were even higher in SY2022 than in SY2021. These enrollment declines were most pronounced in elementary grades, among White students, and among urban high-needs districts. Overall, enrollment reductions were prevalent across almost every grade, and types of districts and students, underlining the fact that earlier declines in public school enrollment in SY2021 were not a one-year aberration. We also see significant increases in home-schooling during the two COVID-19 years, though the evidence is mixed with respect to changes in the number of private school students. Notably, decreases in public school enrollment could also be attributed partly to outmigration. Of all 50 states, New York experienced the highest rate of population decline (1.6%) between July 1, 2021 and July 1, 2020 (U.S. Census Bureau, 2021).

The study’s findings provide important lessons. First, while enrollment had been expected to largely bounce back in the second COVID-19 year, the findings suggest that salient changes in learning environments (particularly cohort size) for most children are likely to persist at least in the near future. Second, the grade-specific changes in enrollment are likely to have financial

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repercussions. Because state and federal school aid is distributed to districts based mostly on enrollment, enrollment declines concentrated in elementary grades, if not reversed, may worsen the fiscal health of many school districts for years to come.

**Data availability**

Data will be made available on request.

**Appendix A. Supplementary data**

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.econlet.2022.110792.

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