Journal of Public Economics 212 (2022) 104710

Contents lists available at ScienceDirect

Journal of Public Economics

journal homepage: www.elsevier.com/locate/jpube

The Pandemic's effect on demand for public schools, homeschooling, and private schools ☆

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ARTICLE INFO

Article history:
Received 16 August 2021
Revised 15 June 2022
Accepted 24 June 2022
Available online 8 July 2022

ABSTRACT

The Covid-19 pandemic drastically disrupted the functioning of U.S. public schools, potentially changing the relative appeal of alternatives such as homeschooling and private schools. We study changes in families' choices of school sector using longitudinal student-level administrative data from Michigan and nationally representative data from the Census Household Pulse Survey. Public school enrollment declined noticeably in fall 2020, with 3 percent of Michigan students and 10 percent of kindergartners using other options. Most of this came from homeschooling rates jumping substantially among families with children in elementary school. Consistent with heterogeneous parental preferences for instructional mode, homeschooling increased more where schools provided in-person instruction while private schooling increased more where instruction was remote. Kindergarten declines were highest among low income and Black families while declines in other grades were highest among higher income and White families, highlighting important heterogeneity by students' existing attachment to public schools. Our results shed light on how families make schooling decisions and imply potential longer-run disruptions to public schools in the form of decreased enrollment and changed composition of the student body.

1. Introduction

A long and active literature has explored parental preferences for school characteristics, such as peer quality and value-added (Abdulkadiroglu et al., 2020; Ainsworth et al., 2020, Campos and Kearns, 2021). Such characteristics are typically stable and well-defined at the time parents make such choices. The Covid-19 pandemic drastically disrupted the functioning of U.S. public schools. By the end of March 2020, all public schools in the U.S. had shifted to remote learning in response to the pandemic and stayed remote until the end of that school year. At the end of that summer, school reopening plans varied tremendously by state and school district, with some students having access to in-person instruction, some having only remote options, and some having hybrid options where instruction was partly in-person and partly remote. In many school districts, the details of those reopening plans were not clear to parents until close to the start of the 2020–2021 school year, and many such plans continued to evolve even once the school year began. The pandemic thus may have substantially altered parents' perceptions of the quality of schooling their children might experience, as well as their perceptions of the physical risk of in-person schooling.

Such disruptions may have changed parental attachment to public schools by affecting the relative appeal of alternatives such as homeschooling and private schools. Changes in the relative appeal of alternative sectors may also interact with the learning modality offered by the public school system. Families with strong preferences for social distancing may, for example, disproportionately choose homeschooling when public schools offer in-person instruction. Conversely, families with a preference for in-person interaction between their children, peers, and teachers may disproportionately choose private schools when the public schools only offer remote options. Heterogeneity in parental preferences for pandemic-related health risk and instruction modality could generate substantially different reactions to this massive shock to the nature of public schooling.

To date, most research on the educational impacts of the Covid-19 pandemic has centered on its damage to student achievement

☆ This research used data structured and maintained by the MERI-Michigan Education Data Center (MEDC). MEDC data is modified for analysis purposes using rules governed by MEDC and are not identical to those data collected and maintained by the Michigan Department of Education (MDE) and/or Michigan's Center for Educational Performance and Information (CEPI). Results, information, and opinions solely represent the analysis, information and opinions of the author (s) and are not endorsed by, or reflect the views or positions of, grantors, MDE and CEPI or any employee thereof. We thank Kristen Evans for excellent research assistance.

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https://doi.org/10.1016/j.jpubeco.2022.104710
0047-2727/

(Bailey et al., 2021; Chetty et al., 2020; Engzell et al., 2021; Kuhfeld et al., 2020) and the economic implications implied by disrupted learning (Azevedo et al., 2020; Hanushek and Woessmann, 2020). We focus here on the pandemic's effects on parental choices of school sector. Pre-pandemic work has documented determinants of parental demand for private schools (Murnane and Reardon, 2018), charter schools (Walters, 2018), and homeschooling (Houston and Toma, 2003; Bhatt, 2014). Post-pandemic research focusing on school sector choices has used either aggregate district-level data on enrollment totals or self-reported data from a limited age range of students (Dee et al., 2021; Dee and Murphy, 2021; Bassok & Shapiro, 2021; Chatterji and Li, 2021).

We use state administrative data and national survey data to document the extent to which the pandemic altered families' attachment to public schooling. Student-level longitudinal data from Michigan and nationally representative data from the Census Household Pulse Survey let us observe families making other schooling choices, such as homeschooling or private schooling. Michigan's data allow us to follow the universe of public school students over time and observe them leaving for specific alternatives, but only in a single state. Prior work documenting the steep pandemic-related enrollment decline has not followed individual students so cannot distinguish the behavior of new students from those with longer attachment to specific schools. Student-level data also permits comparisons between students attending the same school pre-pandemic. The Census data allow us to generate national estimates, but only for homeschooling and without following individual students over time. Together, the two data sets paint a largely consistent picture of the pandemic's impact on public school enrollment, the appeal of alternatives to public schooling, and heterogeneity in parental preferences for such alternatives. We document four central facts.

First, public school enrollment declined noticeably in fall 2020. In Michigan, enrollment dropped by 3 percent among K-12 students and 10 percent among kindergartners. This strong age gradient appears in both overall enrollment numbers and among rates of existing public school students leaving for alternatives. Prior to the pandemic, 4 percent of Michigan public elementary schoolers would not re-enroll the following fall. On average, exit rates for such students increased by more than 50 percent in 2020 and were largest for the youngest students, with the share of kindergarteners not returning for 1st grade almost doubling from 4 to nearly 8 percent. The increase in exit rates decreases monotonically by grade, so much so that more students returned to Michigan public high schools during the pandemic than had in prior years. These overall and age-based patterns in total public school enrollment changes broadly match aggregate data for the nation, where overall enrollment dropped overall by 3 percent, kindergarten enrollment dropped by 13 percent, grade 1–8 enrollment dropped by 3 percent, and high school enrollment increased by 0.4 percent.[1] Ours is the first analysis we are aware of to observe school exit rates based on longitudinal student data, rather than simply compute overall enrollment changes based on aggregate student data.

Second, homeschooling rates jumped substantially in the fall of 2020, driven largely by families with children in elementary school. Movement to homeschooling accounts for the majority of Michigan's students who did not return to the public system, with movement to private schools explaining most of the rest. National data tell a similar story. In February 2020, 4.5 percent of U.S. households with school-aged children reported that at least one child was homeschooled. In fall of 2020, that rate jumped to 7.3 percent. The national data suggests that Michigan's rise in homeschooling rates was very similar to that of the nation. Our national homeschooling estimates are broadly consistent with recent analysis from the U.S. Census Bureau (Eggleston and Fields, 2021), though our analysis is the first to highlight national heterogeneity in homeschooling choice by household income and age.

Third, homeschooling increased more where schools provided in-person instruction, consistent with parents having health concerns or skepticism about remote schooling quality in areas not prioritizing the remote option. The national data shows a larger increase in homeschooling rates in states where more students were offered in-person schooling. Compared to states offering only remote schooling, a state where every student was offered in-person instruction is predicted to see a more than doubling of homeschooling rates. Such patterns are particularly strong among low-income and Black respondents, perhaps related to the larger health toll of the pandemic in such communities. In Michigan, we similarly find that districts providing a fully in-person option saw higher exits for homeschooling than districts offering only remote or hybrid options. The opposite pattern appears for exit rates to private schools, which were larger among districts not offering in-person instruction. That instructional modality differentially affects the relative appeal of different public school alternatives has not been previously observed, even in the most recent and thorough analyses of pandemic-era public school enrollment declines (Dee et al., 2021; Dee & Murphy 2021). These results provide new evidence of preference heterogeneity across families in the relative desirability of in-person versus remote schooling.

Fourth and finally, we document stark differences in patterns of responses between kindergarten and other grades, particularly among students with existing attachment to the public schools. Kindergarten enrollment declines were concentrated among low income and Black students, while the smaller declines in other grades and for incumbent students were disproportionately among higher income and White students. These patterns highlight important differences in how families make decisions. Black and lower income households appear more responsive along the margin of initial enrollment in school systems while White and higher income families appear relatively more responsive to alternative options once already enrolled in the public school system. This socioeconomic pattern by grade has also been seen in Virginia but has not been widely appreciated (Bassok & Shapiro, 2021).

Our results have two broad implications. First, this work sheds light on the dynamics of schooling sector choices. Consistent with the literature on parental preferences under stable school characteristics, we find substantial heterogeneity by race and income when schooling conditions changed due to the pandemic. That low income and Black families were more likely to opt out of in-person instruction in favor of homeschooling during the Covid-19 pandemic is consistent with prior work finding that such families placed more weight on factors beyond academic achievement when making schooling decisions (Hastings et al., 2005). This result adds an additional layer to the accumulating evidence that not only did households have differential exposure to in-person educational options by race and income (Camp & Zamarro, 2021), but that they respond differently even when provided the same options. The learning implications of the shift away from in-person public education will depend on the quality of the alternatives, but emerging evidence of disproportionate economic, health, and social effects of the pandemic on historically disadvantaged communities suggests that there may be a widening of existing achievement gaps in future years.

Second, these findings imply longer-run disruptions to public schools in the form of shifts in cohort size, composition, and school funding. Because kindergarten is optional in many states (includ-

[1] This is based on preliminary Common Core of Data files from the National Center for Education Statistics, summarized here: https://ies.ed.gov/blogs/nces/post/new-data-reveal-public-school-enrollment-decreased-3-percent-in-2020–21-school-year.

ing Michigan), the large drops in kindergarten enrollment in 2020–2021 imply that students who decide to re-enter the public school system may choose to enroll in kindergarten or move directly to first grade. If choosing the former, kindergarten cohorts will be larger than normal and serve a wider range of ages than in prior years. If the latter, first grade cohorts will be larger and serve students with more heterogeneity in their incoming educational experiences. These outcomes not only imply shifts in students' incoming educational and social experiences, but also large swings in school funding. While many states made exemptions for the 2021–2022 school year to avoid drops in funding, elementary schools may be over-subscribed for the next several years due to larger-than-expected cohort sizes. Because low income and Black families were most responsive to pandemic-induced changes, swings in funding needs at these hardest hit schools may have particularly important implications for educational equity.

2. Evidence from Michigan

2.1. Data

We use longitudinal, student-level, administrative data from the Michigan Department of Education (MDE) and the Michigan Center for Educational Performance and Information (CEPI). Students are linked longitudinally as long as they stay in the Michigan public school system, including charter schools. The data contain information on student characteristics such as race, ethnicity, gender, eligibility for subsidized meals, school attended and enrollment status. We use data on students enrolled in grades K through 12 from Fall 2014 to Fall 2020. The Fall 2014–19 data allows us to account for any underlying trends in enrollment prior to the Covid-19 pandemic. Michigan public schools served 1.45 million students in grades K-12 at the start of the 2019–2020 school year, of which 67 percent identify as White, 18 percent as Black, 8 percent as Hispanic, and 3 percent as Asian-American. English Language Learners and Special Education students respectively comprise 6 and 14 percent of the population. Almost half (49 percent) are economically disadvantaged, either through direct certification due to participation in government assistance programs (SNAP, TANF, Medicaid), migrant or homeless status, or through free and reduced price school meal applications based on family's income eligibility.

School districts are required to report information on student enrollment status twice in an academic year, once each in the Fall and the Spring term. For each enrollment count, districts update information on the enrollment status through an "exit code" that categorizes the student as either continuing in the Michigan public school system or, if not, specifying the alternative chosen. Exit codes can include: homeschooling, private schooling, moving out of state, or unknown status. This information is collected in October for all students who appear enrolled at the start of the school year in September. In the fall enrollment data, we can therefore identify the updated enrollment status of students who were "enrolled" at the start of the school year.

We use these exit codes to characterize the enrollment status of all students enrolled in the Michigan public schools in the prior academic year (t-1) as of October of the current year (t). For students on the roster in September of the current year, we group them into one of four categories: continuing in the Michigan public school system, exited the Michigan public school system for homeschool, exited the Michigan public school system for a private school, and exited the Michigan public school system for some other reason. For students who do not appear on the roster in September of the current year, we only know that they have not enrolled, but are unable to characterize their reason for exiting the Michigan school system.[2]

We combine this data with information on modality of instruction in Michigan schools during the pandemic, available on CEPI's Covid-19 dashboard. The dashboard maintains information on the modality of instruction (in-person, hybrid or remote) for public school districts in Michigan for each month of the academic year 2020–2021. Since our analyses uses the Fall enrollment count, we use data on modality of instruction in schools for September 2020, the first full month of the Fall 2020 semester. For our analyses, we categorize school districts into three main categories: (1) "in-person" includes districts that only offered instruction in-person for all five days of the school week, (2) "remote" includes districts that only offered remote instruction all five days of the school week, and (3) "hybrid" includes districts that offered in-person instruction for less than five days per week and remote instruction during the remaining days. Despite these instructional differences, districts typically provided the option for students to attend school virtually even if the instruction was occurring in-person. In these cases, the teacher and some of the students would be in-person, but other students would log in remotely.. In Fall 2020, over half (54 percent) of the students from the Michigan public school system were enrolled in district with in-person instruction, followed by 27 percent in remote districts and 19 percent in hybrid districts.

2.2. Results

Overall public school enrollment in Michigan decreased dramatically following Covid-19 pandemic. Fig. 1 plots the average per-grade October enrollment in Michigan public schools since 2014. Before the Covid-19 pandemic, total enrollment had been declining by just under 1,000 students per grade annually, totaling about 11,000 students per year. In 2020, total enrollment dropped by 46,000 students, which is a drop of more than four times the historic trend and represents a 3 percent decline in total enrollment.[3] The drop was highest in kindergarten, which experienced a 10 percent enrollment decline.[4] Among kindergarten students, enrollment drops were highest among low income and Black students whose enrollment dropped by 11 percent and 19 percent, respectively. In other elementary school grades and middle school grades, enrollment declines in 2020 were more modest at approximately 3 percent, but still substantially higher than in prior years. Enrollment declines in high school grades, on the other hand, were largely in line with prior trends. Overall, these results show that tens of thousands of Michigan families, particularly those with kindergartners, turned to alternatives to the public school sector during Covid-19.

We find overall enrollment drops of 3–4 percent overall in all three modes of instruction, with a slightly higher drop in remote districts compared to in-person and hybrid districts, which is con-

[2] In the years prior to the COVID-19 pandemic, on average, 95.1 percent of students in the Michigan public schools returned the following year, 0.1 percent exited the system for homeschool, 0.1 percent exited the system for private school and 1.2 percent exited for "other" reasons. Students who did not appear on the roster at the start of the school year and whose reason for exit could not be determined were on average 3.5 percent of the Michigan public school population.

[3] See Table A1 for tabulations of total enrollment in Michigan public schools by year, grade, poverty status, and race.

[4] The kindergarten drop is an even more sizable (11.3 percent) when Transitional Kindergarten is included, as in Table A1. The Transitional Kindergarten program in Michigan is a state funded program designed for students who just miss the eligibility cutoff for Kindergarten enrollment but would be five years old by December 1st of the academic year. This program has been expanding over the years in terms of both the number of schools that offer it and enrollment. We exclude transitional kindergarten ("TK") students from our main analysis, though results including TK students are nearly identical.

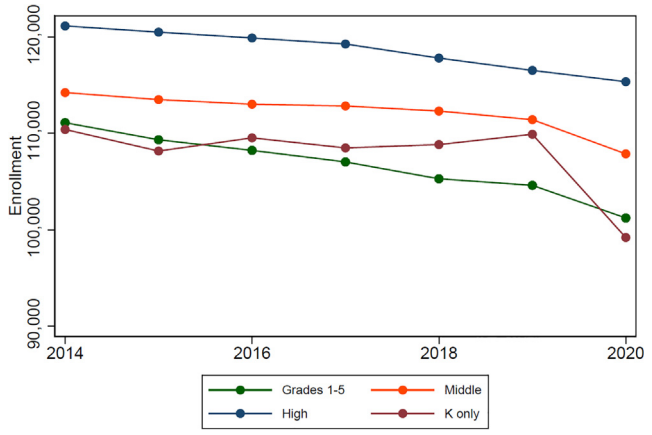

Fig. 1. October Enrollment Per Grade in Michigan Public Schools. Notes: Grades 1–5 is the total enrollment in these grades divided by 5. "Middle" is enrollment in grades 6–8 divided by 3. "High" is enrollment in grades 9–12 divided by 4. K is enrollment in kindergarten, excluding transitional kindergarten and early childhood education. Source: Authors' analysis of student-level data from State of Michigan.

sistent with Dee et al. (2021).[5] The higher drop in remote districts, however, is largely driven by the substantially higher drop in kindergarten enrollment (15 percent), compared to in-person (10 percent) and hybrid (12 percent) districts. This is consistent with parents' stronger preference to not enroll kindergarteners in remote or hybrid schools, compared to in-person. For middle and high schools, the drop in enrollment for in-person districts is actually higher than remote districts, previewing the patterns we find when tracking individual students over time.

Enrollment declines could be the result of increases in students leaving the public system or decreases in typical in-flows into Michigan public schools (e.g., from private schools or other states). Because only a small fraction of Michigan students enroll in the public school system prior to kindergarten (e.g., pre-K or transitional kindergarten), the large declines in kindergarten enrollment primarily reflect changes to in-flows at the first possible enrollment point into the public system. In other grades, however, the changes in enrollment are largely driven by exits among students previously enrolled in the prior grade. Fig. 2 plots year-over-year public school exit rates by grade before and after the start of the pandemic. Prior to the pandemic, about 4 percent of elementary and middle school children typically did not return to the public school system the following October. This rate nearly doubled for kindergartners when the pandemic hit, with nearly 8 percent not returning for 1st grade. Other elementary grades see large increases in exit rates as well, which largely account for the overall enrollment declines in elementary grades. The magnitude of that change decreases until 8th grade, where exit rates are similar pre- and post-pandemic. Interestingly, more students returned to Michigan public high schools during the pandemic than had in prior years.

For the younger grades, most of the increase in exit rates is attributable to students leaving public schools for homeschooling. The bottom panel of Fig. 2 plots year-over-year public school exit rates for those leaving specifically for homeschooling. Prior to the pandemic, only 0.1 percent of students exited for homeschooling, but this rate jumped by 1 to 2 percentage points during the Covid-19 pandemic. Younger students saw the largest increase in homeschool rates. For rising first-graders, exits to homeschooling can account for more than half (1.9/3.4 = 56 percent) of the total increase in exit rates. Exits to private school were similarly rare (0.1 percent) prior to the pandemic, but also saw increases for grades below high school.[6] The private school increase for rising first graders can account for one-seventh (0.5/3.4 = 15 percent) of the total increase in exit rates. Current and rising high school students saw very small increases in home or private schooling during the pandemic.

Post-pandemic changes in exit rates among Michigan elementary school students show substantial heterogeneity by race and English language learner status, as well as some heterogeneity by income and school districts' fall 2020 instructional mode. The top panel of Fig. 3 shows that elementary schoolers' exit rates increased sharply from 4.1 to 6.4 percent. White students' exit rates nearly doubled from 3.3 to 6.2 percent, while Black and Hispanic students' exit rates each increased by only one percentage point. Asian students' exit rates actually decreased. Non-poor students' exit rates increased by 2.7 percentage points, somewhat more than the 1.9 percentage point rise for poor students. ELL students' exit rates were nearly unchanged. Special education students' exit rates increase only a bit more than those of non-special education students. Finally, exit rates in districts that offered fully in-person instruction jumped by 2.7 percentage points, more than the 1.9 percentage point increase in fully remote districts and the 2.2 percentage point increase in hybrid districts. This is consistent with the state-level evidence from the Household Pulse Survey presented below, in that in-person instruction was associated with a larger move away from public schools. Even hybrid districts—which typically have in-person instruction on some days and remote instruction on others—have somewhat higher exit rates than fully remote districts.

Most of the heterogeneity in exit rate changes is explained by differences in shifts toward homeschooling. The bottom panel of Fig. 3 shows the fraction of Michigan elementary schoolers exiting for homeschooling. Pre-pandemic, 0.2 percent of White students typically left Michigan elementary schools for homeschooling. Post-pandemic, that fraction jumps to 2.0 percent. For Hispanic students, the exit rate to homeschooling increases from 0.1 percent to 0.8 percent. Black and Asian students show relatively little change. Districts with in-person instruction see a substantially larger increase in exit to homeschooling (1.7 percentage points) than fully remote districts (0.8 percentage points) or districts offering hybrid instruction (1.1 percentage points). The disproportionate exit to homeschooling from in-person districts may be caused by a concern over health risks of in-person schooling.[7] Shifts to private schooling are substantially smaller, though White and non-poor students show the largest such changes.[8]

The observed heterogeneity by race, income and other factors occurs not just across different school districts but within districts and even within schools. Table 1 estimates heterogeneity in post-Covid elementary school exit rate changes with regression models that include school fixed effects fully interacted with a post-Covid dummy, allowing us to compare students who attended the same school before Covid.[9] This largely holds constant families' outside schooling options and many other neighborhood characteristics. The patterns are broadly consistent with the uncontrolled estimates shown in Fig. 3. White students, the omitted group, have larger

[5] See Table A2 for total enrollment by year, grade, and modality (in-person, remote or hybrid).

[6] See Fig. A2 for private school results.

[7] Many districts also offered the option to log in remotely, even if instruction was offered in-person. This option obviates health concerns of in-person schooling, but also introduces a new set of concerns regarding the efficacy of remotely accessing instruction that is conducted in person and intended for an in-person classroom.

[8] See Fig. A3 for details.

[9] Full regression results are reported in Table A3.

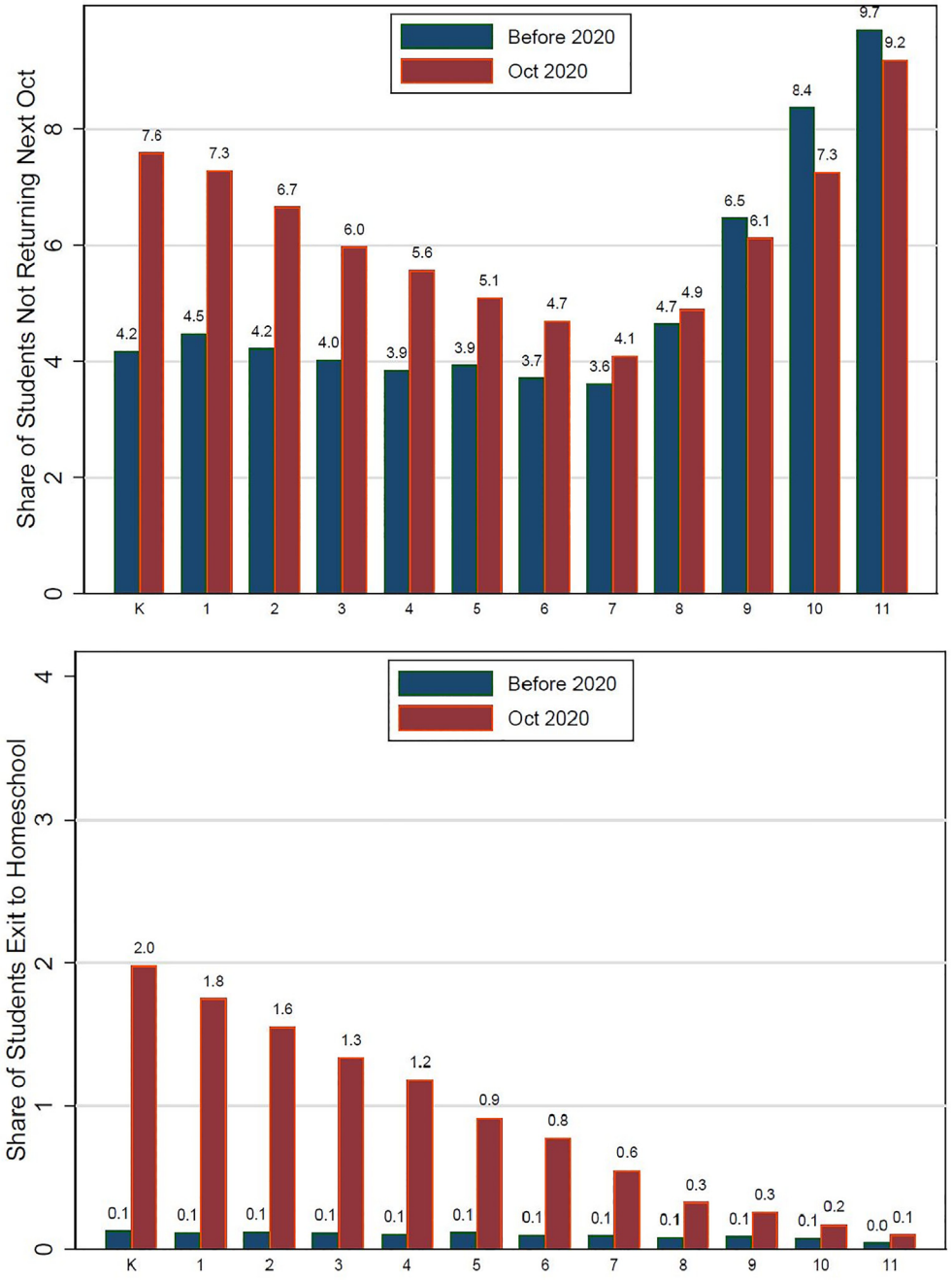

Fig. 2. Exit Rate from Michigan Public Schools by Grade. Notes: Figure plots the share of students that were enrolled in a Michigan public school in October that were not enrolled in a Michigan public school the following October (top panel) and for whom the exit status was marked as "homeschool" (bottom panel). Grade refers to base year. Sample include all K-11 students enrolled in Michigan public schools Fall 2014 to 2019, excluding students in transitional kindergarten and early childhood education.

increases in exit rates than other groups even when controlling for other characteristics and making comparisons to students within the same school. Homeschooling and private schooling are the largest contributor to this heterogeneity. Non-white and ELL students experienced much smaller shifts towards these alternative schooling options during the pandemic. Students from poor families are more likely to turn to homeschooling and less likely to turn to private schooling. Families were more likely to choose homeschooling in districts offering in-person instruction and more likely to choose private schooling in districts offering remote or hybrid instruction. The preference heterogeneity implied by these different household responses suggests caution in treating homeschooling and private schooling as identical substitutes for public education.

3. National evidence

3.1. Data

To complement our Michigan results, we present national evidence using the Household Pulse Survey (HPS) from the U.S. Census. The HPS was designed to quickly collect and disseminate data on how U.S. households were impacted by Covid. The survey began in April 2020 and has continued through the present, with results being released on a rolling basis in nearly real-time. We use the HPS to examine trends in homeschooling rates, as the HPS asks each household with school-age children whether any of those children are being homeschooled, as opposed to attending

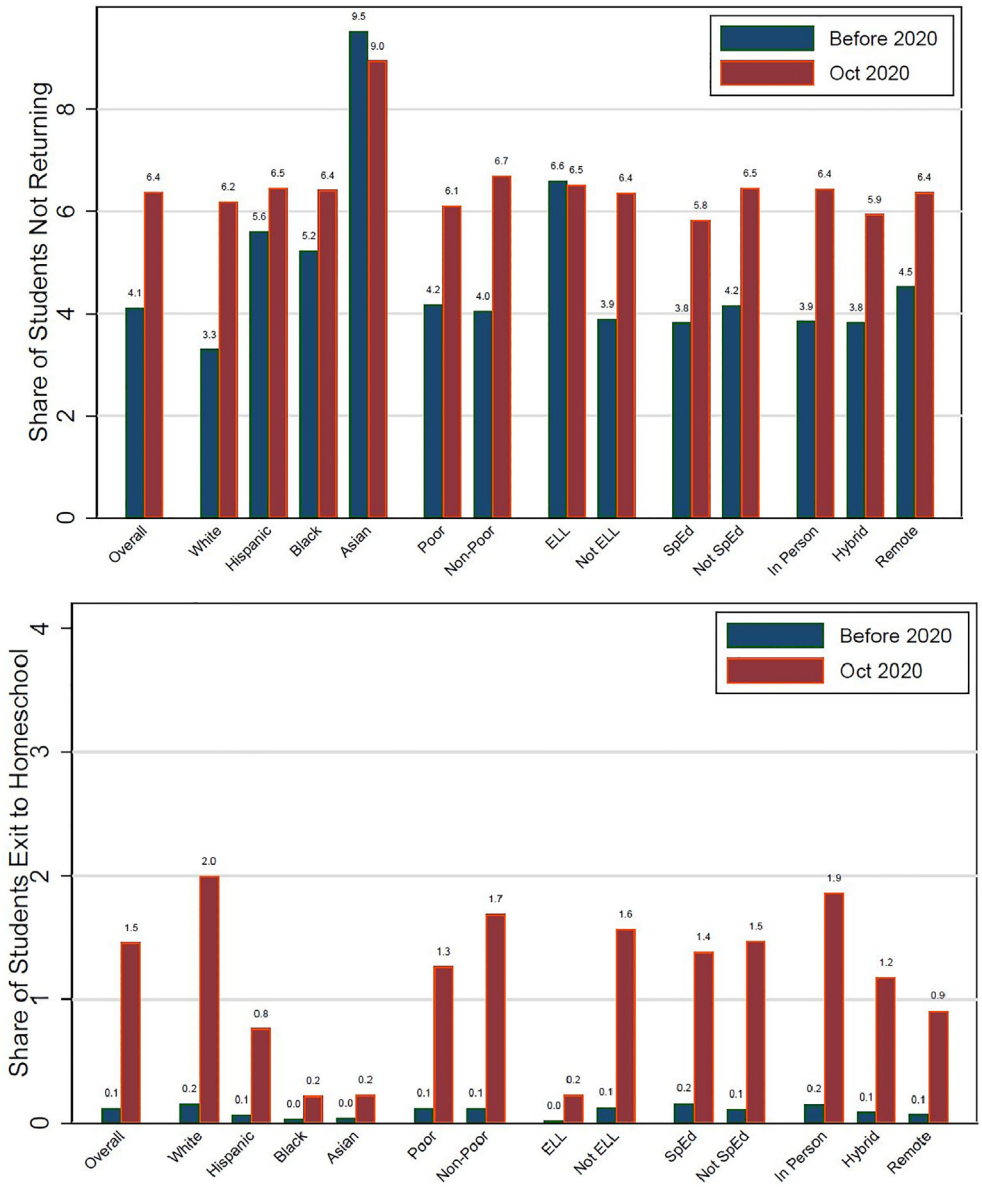

Fig. 3. Heterogeneity in Elementary Students' Exit Rate from Michigan Public Schools. Notes: Figure plots the share of students that were enrolled in a Michigan public school in October that were not enrolled in a Michigan public school the following October (top panel) and for whom the exit status was marked as "homeschool" (bottom panel). Sample include all elementary students enrolled in Michigan public schools Fall 2014 to 2019, excluding students in transitional kindergarten and early childhood education.

a public or private school (which are not distinguished). Respondents in early waves were asked about pre-pandemic homeschooling status as of February 2020, while those in later waves were asked about current homeschooling status. While the HPS only allows for the analysis of one alternative to the public-school sector, it has the advantage of providing a nationally representative picture of the changes in demand for homeschooling during the pandemic.

Pre-pandemic household homeschooling rates estimated from the HPS are consistent with administrative data on student-level homeschooling rates.[10] The fraction of U.S. students being homeschooled as of 2018 was just below 4 percent, while HPS places the fraction of households with at least one homeschooled student at about 4.5 percent. These are both close in magnitude and directionally consistent, given that household-level rates of homeschooling should mechanically be higher than student-level rates because some households homeschool some but not all of their children. State-level estimates of homeschooling rates from the HPS match fairly well to administrative data from those states. States that administratively report homeschooling being more common have higher fractions of respondents reporting homeschooling in the HPS, with a correlation of just over 0.5 between the HPS and such administrative data. The HPS thus seems to measure fairly accurately the state of pre-pandemic homeschooling.

We combine the HPS data with national data on school instructional modes in the 2020–2021 school year to examine the link between in-person schooling and homeschooling rates. The in-person schooling data comes from Burbio, a private company that began systematically collecting information about school districts' learning modes during the pandemic. Every three days, Burbio collected for over 1,200 school districts publicly available data on the district's learning mode from sources such as district websites and Facebook posts. Burbio then generated weekly measures by county of the fraction of grades in each school district following an in-

[10] See Fig. A4 for details.

Table 1
Heterogeneity in Effect of COVID on Enrollment Status.

	Did Not Return		Schooling Choice Instead of Returning to MI Public School Homeschool		Private school	
	(1)	(2)	(3)	(4)	(5)	(6)
Post COVID	0.035***		0.021***		0.006***	
	(0.001)		(0.001)		(0.001)	
X Black	−0.013**	−0.016***	−0.016***	−0.008***	−0.004***	−0.003***
	(0.006)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
X Hispanic	−0.010***	−0.009***	−0.008***	−0.005***	−0.001***	−0.001***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)
X Asian	−0.028***	−0.028***	−0.011***	−0.008***	−0.004***	−0.007***
	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)
X Poor	−0.003***	0.000	0.000	0.002***	−0.005***	−0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
X Spec Ed	−0.005***	−0.004***	−0.002***	−0.002***	−0.002***	−0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
X ELL	−0.021***	−0.013***	−0.010***	−0.005***	−0.003***	−0.001**
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)
Constant	0.021***	0.028***	0.002***	0.004***	0.002***	0.003***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
School FE × PostCOVID	N	Y	N	Y	N	Y
N	3,827,059	3,883,322	3,827,059	3,883,322	3,827,059	3,883,322
R-squared	0.008	0.021	0.011	0.023	0.003	0.012

Notes: All regressions also include a linear time trend, indicators for 5 race/ethnicity categories (Black, Hispanic, Asian, Native American, Hawaiian; White is omitted), indicators for Economic disadvantage, Special Education status, Migrant status, English Language Learner, Male, Hybrid or both instruction and Remote only instruction (in-person only is omitted). Estimations in even columns control for school fixed effects and school by post covid fixed effects. Sample includes all students enrolled in Michigan elementary schools in October from 2014 to 2019. Status is as of October of the following year. Homeschool, private school, and other exit status are available for all students whose name is on the school roster in September. Students that do not appear on the roster in September are classified as unknown status. Sample size is smaller in odd columns because modality is not available for a small number of districts. Robust standard errors clustered by district in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

person, hybrid, or virtual learning mode. We aggregate these measures to the state level to connect with state-level measures of homeschooling rates from the HPS.

3.2. Results

National homeschooling rates increased dramatically in response to the pandemic. Fig. 4 shows the percentage of U.S. households with school-aged children who have at least one student being homeschooled. The blue bars show the percentage based on February 2020, which provide a measure of baseline homeschooling rates, while the red bars present the homeschooling rates for the fall of 2020. In February 2020, 4.5 percent of U.S. households with school-aged children reported that at least one child was homeschooled. This rate jumped to 7.3 percent in the fall of 2020. Because homeschooling rates over the past decade have largely been constant (Eggleston and Fields, 2021; Wang et al., 2019), this sudden change in response to Covid represents a substantial departure from recent trends. The second set of bars includes only the responses to the HPS from Michigan households and shows that Michigan appears similar to the U.S. in terms of homeschooling. This strengthens our argument that the previously discussed results from Michigan's administrative are likely broadly in line with national trends.

The national increase in homeschooling rates shows substantial heterogeneity by race, income and age. Black household homeschooling rates nearly triple by increasing 6.1 percentage points, compared to increases of 2.1–2.5 percentage points among White, Hispanic and Asian households. Among households earning below $50,000, homeschooling rates more than double by increasing 7.5 percentage points, compared to a 2.5 percentage point increase for households earning $100,000 or more. This concentrated shift among low-income and Black families may be driven—at least in part—due to the disproportionate impact of the pandemic on historically disadvantaged populations (Thakur et al., 2020). Though HPS does not record children's ages, we can infer them from the age of the respondent. Consistent with our Michigan results, the households with the youngest respondents and thus on average the youngest children also show the largest shift toward homeschooling. Households headed by those 40 and under show a 3.6 percentage point increase in homeschooling rates, while those headed by respondents over 45 show a 2.1 percentage point increase.

While nearly every school across the country closed March 2020, there was substantial heterogeneity across states in schooling re-openings by the fall. States in the southeastern United States pushed to quickly re-open schools for in-person learning, while many other states across the country remained fully remote. These differences in learning modality affect the tradeoffs in households' choices between homeschooling and enrolling in the public-school system. For example, in areas where in-person instruction resumed, parents had to weigh the health costs of potential Covid exposure with the educational benefits of in-person learning.

Homeschooling rates rose less in states where more students continued to be offered virtual learning in fall 2020. The last three sets of bars in Fig. 4 show that homeschooling increased by 2.5 percentage points in states where more than two-thirds of students were offered virtual instruction. In comparison, homeschooling increased by 3.5 percentage points in states offering virtual instruction to less than one-third of students. Appendix Fig. A5 presents additional detail of the state-level relationship between changes in household homeschooling rates and the fraction of students offered remote, hybrid, or in-person learning. There is a distinctly negative and statistically significant relationship between these remote instruction and homeschooling increases. There is a corresponding positive and statistically significant relationship between in-person learning and homeschooling, but no relationship between hybrid learning and homeschooling. On average, the predicted difference in homeschooling is 2.4 percentage points higher, or more than twice as high, in states that offered every student in-person instruction relative to states that remained remote or hybrid. These patterns are particularly strong among low-income and Black households.[11] Overall, this suggests that the added benefit of in-person instruction was not enough to outweigh

[11] See Figs. A6 and A7.

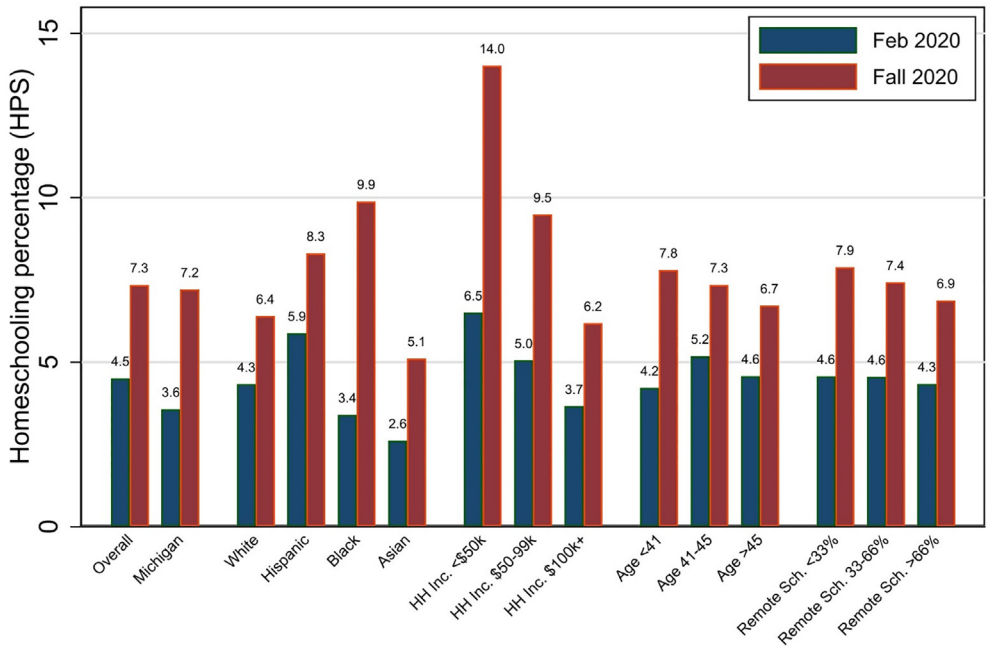

Fig. 4. Nationwide Changes in Household Rates of Homeschooling. Notes: Homeschooling data come from the U.S. Census, Household Pulse Survey. The change in homeschooling compares the fall homeschooling rates (September through October 2020) to pre-pandemic rates (February 2020), weighted by population. Homeschooling rates are defined as the fraction of households with school-aged children who are homeschooling at least one of those children. Instructional mode is based on share of students in each state that report remote schooling September through October 2020.

the costs of returning to in-person learning amidst a pandemic, particularly among communities where health risks may have been greater. Even states offering hybrid options to most students—which typically offer in-person learning for some fraction of the week—had higher homeschooling increases than fully remote instruction.

4. Conclusion

By combining detailed student-level administrative data from Michigan with national survey data, we provide new insights into the determinants of families' education sector choices during the pandemic. At a high level, our main results are in line with a growing set of reports that the pandemic caused an unprecedented shift away from the public education sector, particularly for Black, low-income and kindergarten students (Bassok & Shapiro, 2021; Dee et al., 2021, Dee & Murphy, 2021).

Our analysis also uncovers important, previously undocumented preference heterogeneity as families chose among two key alternatives to the public school sector: homeschooling and private schooling. Shifts to both of these alternative sectors increased substantially during the pandemic, though homeschooling rates disproportionately increased in districts that provided in-person instruction. Private schooling, on the other hand, increased more in districts offering remote instruction. The choice between in-person and remote schooling was among the most controversial decisions policymakers faced during the pandemic, and these divergent patterns highlight how either learning modality was likely to motivate a shift of substantial numbers of would-be public sector students to alternative educational sectors.

We also document important heterogeneity along the margin of initial school enrollment in kindergarten compared to continued enrollment in older grades. Low income and Black families were relatively less likely to enroll their children in kindergarten than other groups, but higher income and White students were more likely to exit the public system in favor of alternatives. These results add important nuance to our understanding of the determinants of education sector preferences during the pandemic and contribute a unique perspective to prior work showing heterogeneous schooling preferences by race and income when school characteristics are stable (Hastings et al., 2005).

These enrollment changes have important short- and long-term implications. In the short term, policymakers and public school administrators have been fiercely debating the costs and benefits of in-person schooling. At the time of writing, policymakers are grappling with these decisions for the 2021–2022 school year amid concerns over the spread of the Delta variant of Covid-19. These results suggest that either decision—whether it be to hold remote, hybrid, or in-person instruction—will likely cause substantial continued disengagement from the public education system for some set of families.

These enrollment changes also have clear longer-term fiscal implications for the public school sector and educational consequences for students. To the extent that a large percentage of students remain enrolled in alternative sectors, public school systems will face unprecedented drops in funding. Because these enrollment drops are concentrated among elementary schools serving low-income and Black students, these funding challenges will present additional consequences for equity. To the extent that students largely re-enroll in the public sector, there will be lingering implications for learning and development, driven by large shifts in cohort size, composition, and students' educational preparation. For instance, students who skip kindergarten due the pandemic and enroll directly in first grade will be the same age as their peers who enrolled in kindergarten at the traditional age, but will have had greater heterogeneity in their educational and social development. Students who delay enrollment in kindergarten, on the other hand, will be older than their peers. In addition to the developmental and pedagogical implications for managing a larger than usual and mixed age set of students, these decisions come with fiscal and organizational challenges for public schools, including staffing challenges. Because the largest shifts have occurred among lower-income and Black students, these shifts highlight the importance of attending to these challenges for educational equity.

Acknowledgements

This research was supported by training grant R305B170015 from the U.S. Department of Education's Institute of Education Sciences.

Appendix

Figs. A1-A7.
Tables A1-A3.

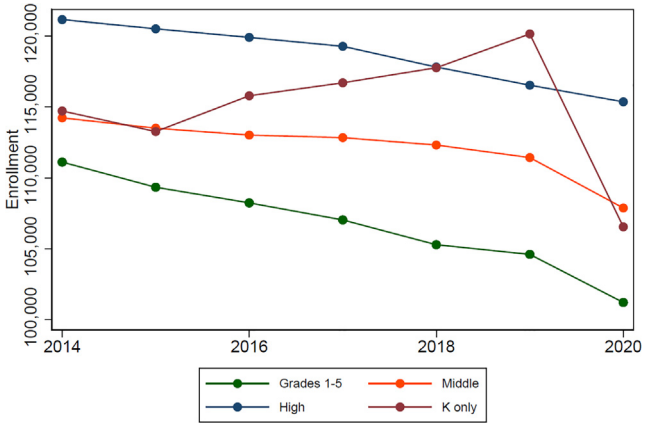

Fig. A1. October Enrollment Per Grade in Michigan Public Schools, With Transitional Kindergarten. Notes: "Grades 1–5" is the total enrollment in these grades divided by 5. "Middle" is enrollment in grades 6–8 divided by 3. "High" is enrollment in grades 9–12 divided by 4. K is enrollment in K and TK. Notes: Grades 1–5 is the total enrollment in these grades divided by 5. "Middle" is enrollment in grades 6–8 divided by 3. "High" is enrollment in grades 9–12 divided by 4. K is enrollment in kindergarten or transitional kindergarten.

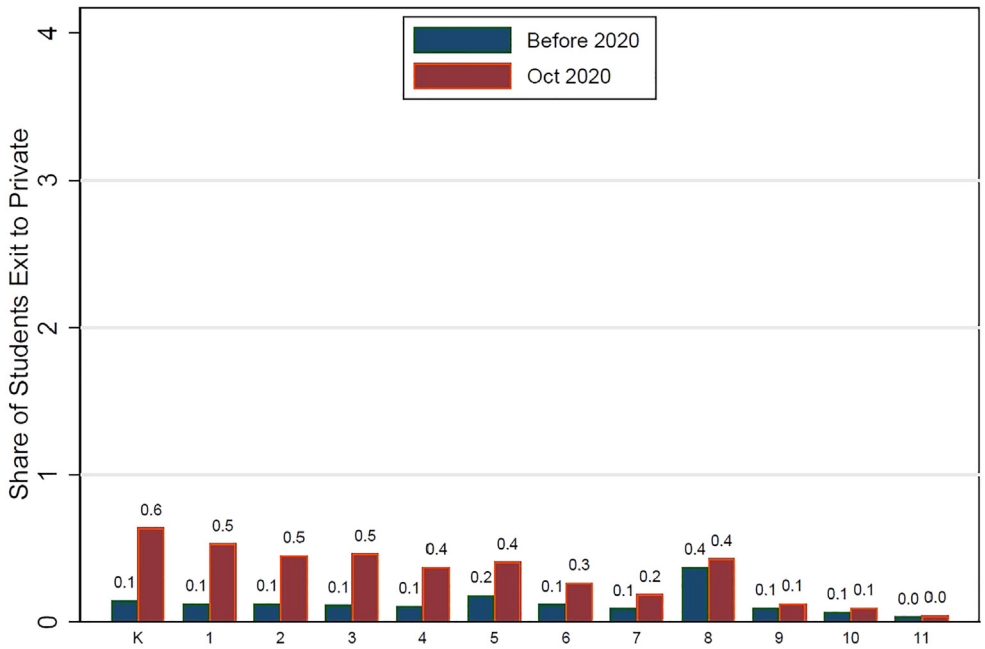

Fig. A2. Exit Rate to Private School. Notes: Figure plots the share of students that were enrolled in a Michigan public school in October that were not enrolled in a Michigan public school the following October and for whom the exit status was marked as "non-public school". Grade refers to base year. Sample include all K-11 students enrolled in Michigan public schools Fall 2014 to 2019, excluding students in transitional kindergarten and early childhood education.

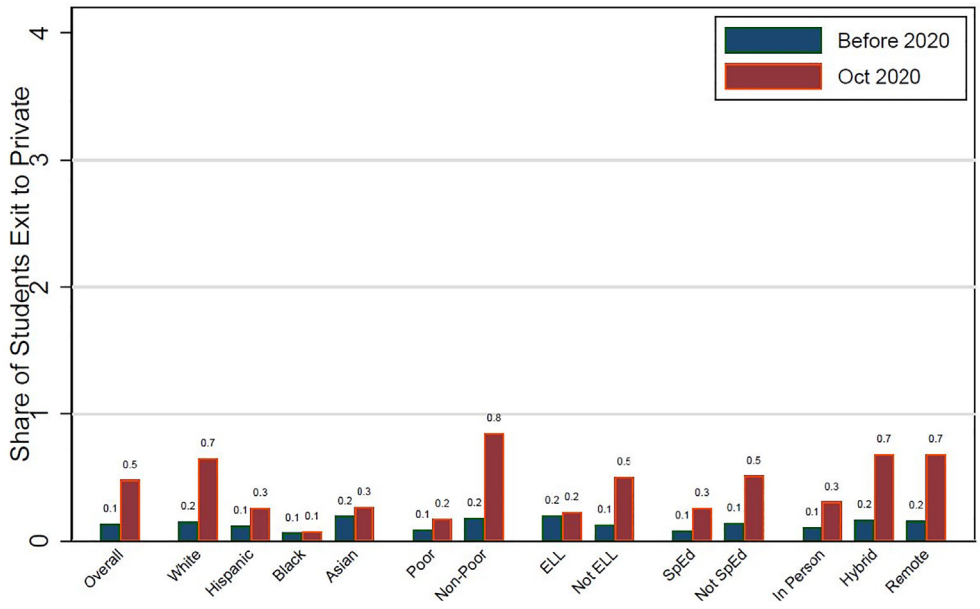

Fig. A3. Heterogeneity in Elementary Students' Exit Rate to Private School. Notes: Figure plots the share of students that were enrolled in a Michigan public school in October that were not enrolled in a Michigan public school the following October and for whom the exit status was marked as "non-public school". Sample include all elementary students enrolled in Michigan public schools Fall 2014 to 2019, excluding students in transitional kindergarten and early childhood education.

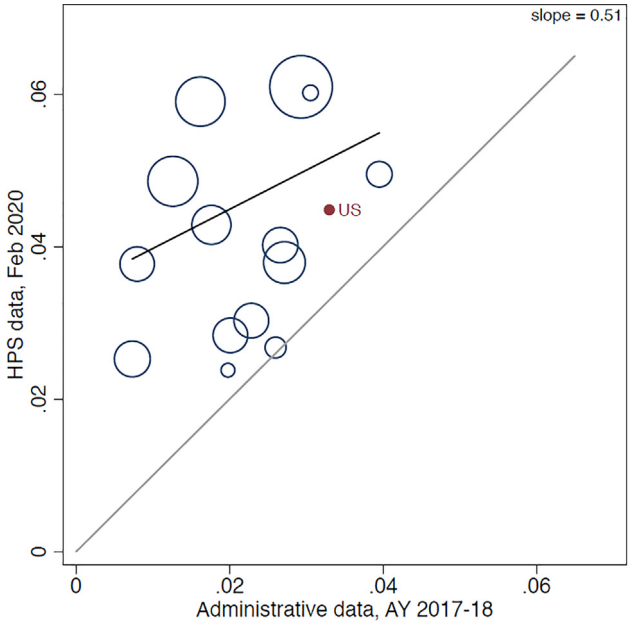

Fig. A4. Comparison of State-Level Homeschooling Rates: HPS vs. Administrative Data. Notes: HPS data come from the U.S. Census, Household Pulse Survey and are based on pre-pandemic household homeschooling rates (February 2020). Administrative Data come from the 2017–18 school year and reflect student-level homeschooling rates published by each state. States are weighted by their population.

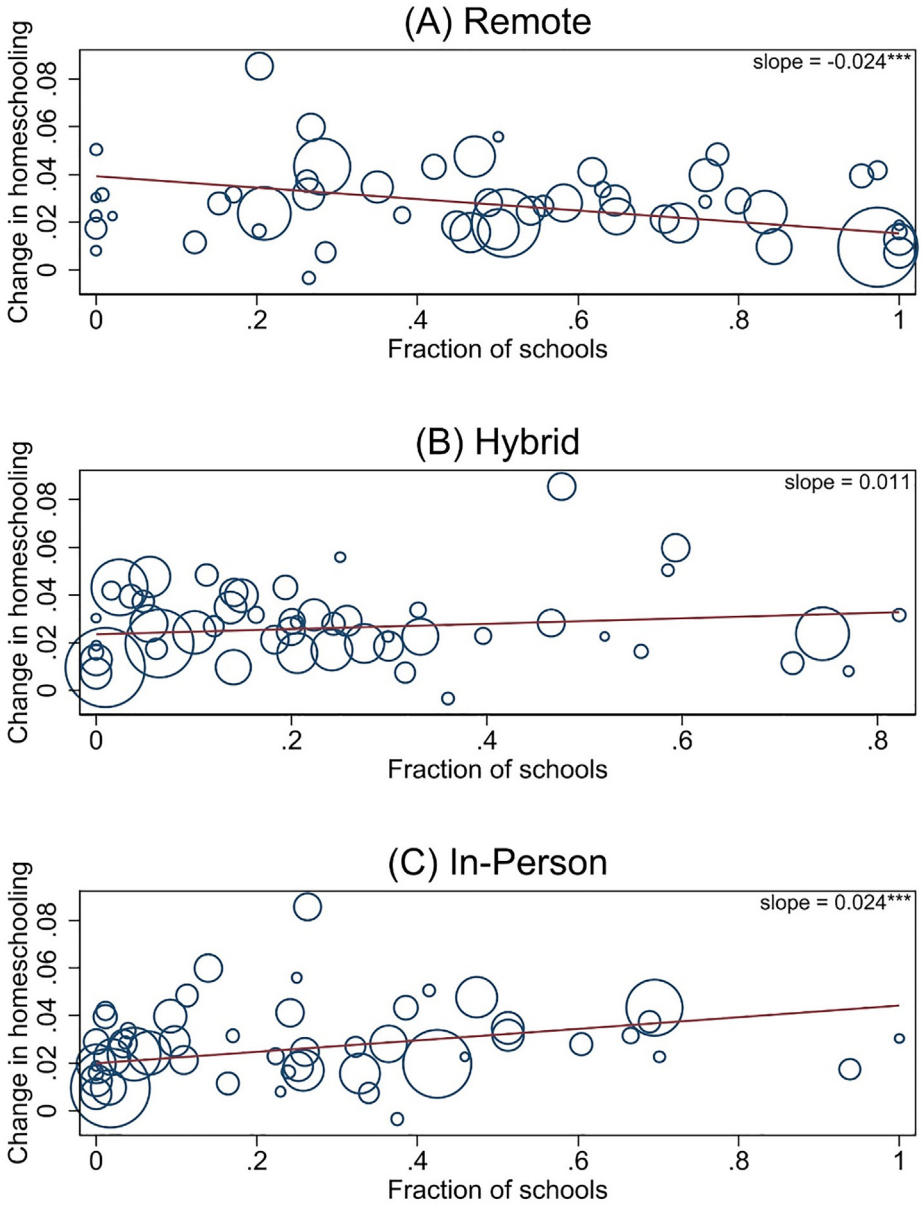

Fig. A5. State-Level Homeschooling Rate Changes by Fall 2020 Learning Modality. Notes: Homeschooling data come from the U.S. Census, Household Pulse Survey. The change in homeschooling compares the fall homeschooling rates (September through October 2020) to pre-pandemic rates (February 2020). Homeschooling rates are defined as the fraction of households with school-aged children who are homeschooling at least one of those children. School re-opening status comes from Burbio and is defined as of September 2020. Each state is weighted by population. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

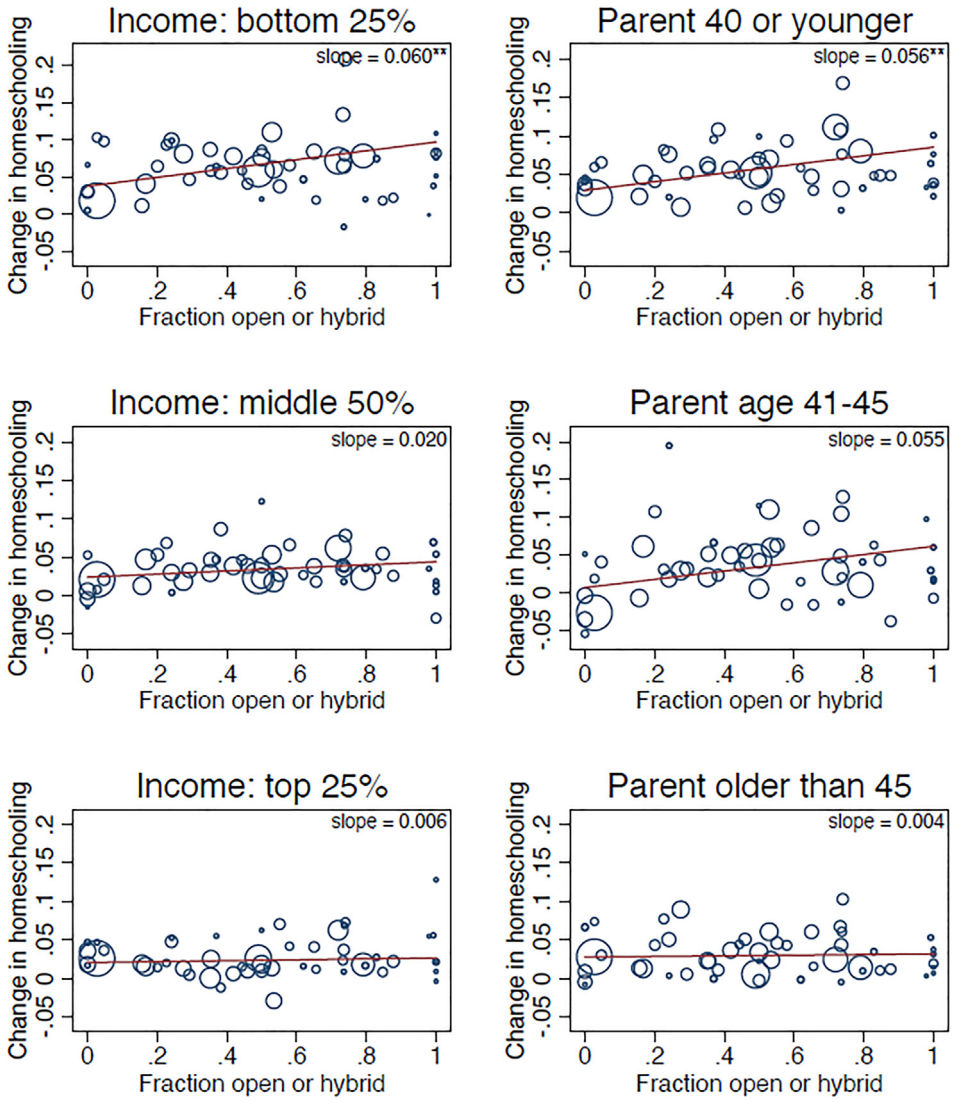

Fig. A6. Heterogeneity in State-Level Homeschooling Rate Changes by Fall 2020 Learning Modality. Notes: Homeschooling data come from the U.S. Census, Household Pulse Survey. The change in homeschooling compares the fall homeschooling rates (September through October 2020) to pre-pandemic rates (February 2020). School re-opening status comes from Burbio and is defined as of September 2020. Each state is weighted by population. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

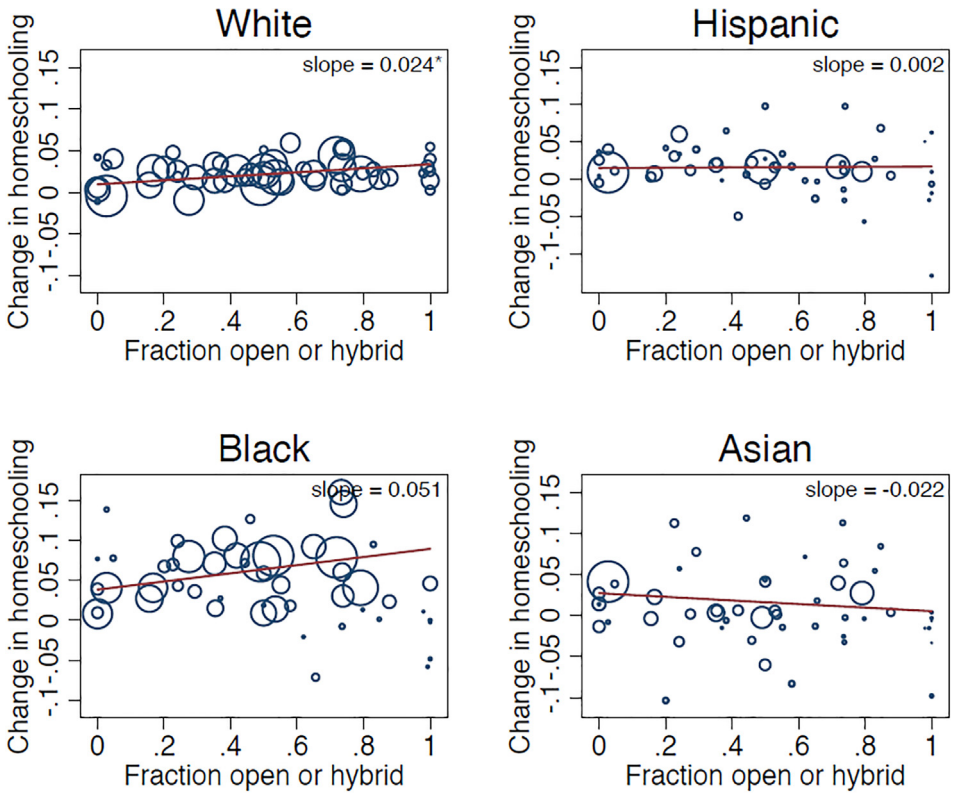

Fig. A7. Changes in States' Homeschooling Rates, by Fall 2020 Learning Modality and Household Race/Ethnicity. Notes: Homeschooling data come from the U.S. Census, Household Pulse Survey. The change in homeschooling compares the fall homeschooling rates (September through October 2020) to pre-pandemic rates (February 2020). School re-opening status comes from Burbio and is defined as of September 2020. Each state is weighted by population. * p < 0.05, ** p < 0.01, *** p < 0.001.

Table A1
Total Enrollment at Michigan Public Schools by Year, Grade, Poverty and Race.

							2020–21 Change	
	2017	2018	2019	2020	2021	2022	Number	Percent
Total	14,75,570	14,67,424	14,52,331	14,43,553	13,97,670	13,91,863	−45,883	−3.2%
Kindergarten	1,15,780	1,16,696	1,17,755	1,20,138	1,06,546	1,14,821	−13,592	−11.3%
Grades 1–5	5,41,175	5,35,169	5,26,431	5,23,028	5,06,086	5,03,619	−16,942	−3.2%
Middle	3,39,037	3,38,495	3,36,925	3,34,283	3,23,622	3,13,671	−10,661	−3.2%
High	4,79,578	4,77,064	4,71,220	4,66,104	4,61,416	4,59,752	−4,688	−1.0%
Poor								
Total	6,78,144	7,40,011	7,28,409	7,30,832	7,07,986	7,13,320	−22,846	−3.1%
Kindergarten	55,001	59,867	60,054	60,631	53,751	58,915	−6,880	−11.3%
Grades 1–5	2,74,484	2,92,958	2,86,550	2,85,695	2,76,695	2,76,149	−9,000	−3.2%
Middle	1,55,426	1,69,960	1,69,714	1,70,624	1,66,084	1,62,630	−4,540	−2.7%
High	1,91,018	2,13,576	2,08,162	2,09,330	2,08,650	2,11,747	−680	−0.3%
Non-Poor								
Total	7,97,426	7,27,413	7,23,922	7,12,721	6,89,684	6,78,543	−23,037	−3.2%
Kindergarten	54,536	48,624	48,786	49,273	45,451	46,507	−3,822	−7.8%
Grades 1–5	2,66,691	2,42,211	2,39,881	2,37,333	2,29,391	2,27,470	−7,942	−3.3%
Middle	1,83,611	1,68,535	1,67,211	1,63,659	1,57,538	1,51,041	−6,121	−3.7%
High	2,88,560	2,63,488	2,63,058	2,56,774	2,52,766	2,48,005	−4,008	−1.6%
Black								
Total	2,62,042	2,60,342	2,56,163	2,55,107	2,46,473	2,46,776	−8,634	−3.4%
Kindergarten	20,502	20,184	20,669	20,848	16,888	19,821	−3,960	−19.0%
Grades 1–5	1,00,396	99,973	98,666	98,597	95,517	93,762	−3,080	−3.1%
Middle	58,498	58,907	58,853	58,599	57,529	56,399	−1,070	−1.8%
High	82,646	81,278	77,975	77,063	76,539	76,794	−524	−0.7%
White								
Total	9,87,176	9,75,019	9,58,806	9,46,294	9,09,381	8,97,789	−36,913	−3.9%
Kindergarten	75,682	76,411	76,526	78,079	70,221	73,610	−7,858	−10.1%
Grades 1–5	3,51,335	3,44,660	3,36,738	3,32,399	3,18,579	3,17,029	−13,820	−4.2%
Middle	2,28,590	2,26,145	2,22,620	2,19,266	2,10,035	2,01,479	−9,231	−4.2%

(*continued on next page*)

Table A1 (*continued*)

							2020–21 Change	
	2017	2018	2019	2020	2021	2022	Number	Percent
High	3,31,569	3,27,803	3,22,922	3,16,550	3,10,546	3,05,671	−6,004	−1.9%
Hispanic								
Total	1,12,578	1,14,615	1,16,421	1,18,108	1,17,526	1,20,360	−582	−0.5%
Kindergarten	9,609	9,565	9,653	9,756	8,928	9,905	−828	−8.5%
Grades 1–5	44,148	44,354	43,957	43,960	43,419	43,717	−541	−1.2%
Middle	26,400	26,915	27,907	28,142	27,820	27,472	−322	−1.1%
High	32,421	33,781	34,904	36,250	37,359	39,266	1,109	3.1%
Asian								
Total	48,533	49,747	50,347	50,602	49,698	49,199	−904	−1.8%
Kindergarten	3,678	3,894	4,062	4,025	3,825	3,901	−200	−5.0%
Grades 1–5	18,047	18,313	18,453	18,768	18,659	18,481	−109	−0.6%
Middle	11,335	11,309	11,323	11,236	11,088	10,794	−148	−1.3%
High	15,473	16,231	16,509	16,573	16,126	16,023	−447	−2.7%

Notes: Kindergarten enrollment includes Transitional Kindergarten.

Table A2
Total Enrollment at Michigan Public Schools by Modality of Instruction in Fall **2020.**

							2020–21 Change	
	2017	2018	2019	2020	2021	2022	Number	Percent
	In Person							
Total	7,66,322	7,68,304	7,62,506	7,59,578	7,34,569	7,32,638	−25,009	−3.29%
Kindergarten	60,649	62,124	63,018	64,055	57,827	61,099	−6,228	−9.72%
Grades 1–5	2,76,980	2,76,301	2,72,823	2,72,791	2,63,434	2,63,588	−9,357	−3.43%
Middle	1,75,604	1,76,129	1,75,961	1,74,999	1,68,320	1,63,825	−6,679	−3.82%
High	2,53,089	2,53,750	2,50,704	2,47,733	2,44,988	2,44,126	−2,745	−1.11%
	Hybrid							
Total	2,77,602	2,75,340	2,71,389	2,69,343	2,60,176	2,58,072	−9,167	−3.40%
Kindergarten	22,177	22,274	22,371	23,218	20,462	22,177	−2,756	−11.87%
Grades 1–5	1,04,300	1,02,915	1,00,670	99,460	96,126	95,243	−3,334	−3.35%
Middle	64,535	64,199	63,458	63,193	61,149	58,642	−2,044	−3.23%
High	86,590	85,952	84,890	83,472	82,439	82,010	−1,033	−1.24%
	Remote							
Total	3,94,411	3,93,927	3,89,277	3,86,199	3,72,316	3,68,293	−13,883	−3.59%
Kindergarten	30,675	30,757	31,023	31,660	26,922	29,987	−4,738	−14.97%
Grades 1–5	1,47,790	1,47,256	1,45,130	1,43,914	1,38,416	1,35,435	−5,498	−3.82%
Middle	90,764	91,343	90,654	89,607	87,172	84,029	−2,435	−2.72%
High	1,25,182	1,24,571	1,22,470	1,21,018	1,19,806	1,18,842	−1,212	−1.00%

Notes: "In person" includes districts that were operating fully in person only for all students, and districts that were operating fully in person but provided parents and students the option to receive remote instruction."Remote" includes districts that were only offering remote instruction to all students. "Hybrid" includes districts that were offering part remote and part in person instruction to all students, as well as districts that offered hybrid instruction to some students and fully remote to others. The overall enrollment numbers are slightly lower than the total enrollment in MI public schools in Table A1. This is because data on modality of instruction was not available for a some districts. These districts enrolled<2% of the MI public school students.

Table A3
Heterogeneity in Effect of COVID on Enrollment Status in Next Year Continuing Students.

	Did Not Return		Reason for Not Returning to MI Public School: Home school		Private school		Other exit status		Unknown	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Post COVID	0.035***		0.021***		0.006***		0.004***		0.005***	
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
X Black	−0.013**	−0.016***	−0.016***	−0.008***	−0.004***	−0.003***	−0.001	−0.002**	0.008	−0.003***
	(0.006)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)	(0.001)	(0.008)	(0.001)
X Hispanic	−0.010***	−0.009***	−0.008***	−0.005***	−0.001***	−0.001***	−0.002	−0.001	0.001	−0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)
X Asian	−0.028***	−0.028***	−0.011***	−0.008***	−0.004***	−0.007***	0.001	−0.002	−0.013***	−0.011***
	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)
X American Indian	−0.009	−0.005	−0.008***	−0.007**	0.000	0.001	−0.000	0.000	−0.001	0.001
	(0.006)	(0.006)	(0.003)	(0.003)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
X Hawaiian	0.011	0.011	0.000	0.001	0.000	0.001	0.009	0.008	0.002	0.001
	(0.015)	(0.014)	(0.006)	(0.006)	(0.003)	(0.003)	(0.010)	(0.010)	(0.008)	(0.009)
X Poor	−0.003***	0.000	0.000	0.002***	−0.005***	−0.002***	0.001*	0.001**	0.000	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)
X Special Education	−0.005***	−0.004***	−0.002***	−0.002***	−0.002***	−0.002***	−0.000	−0.001	−0.001	−0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
X Migrant	0.014	0.007	−0.003*	−0.007***	0.002*	−0.000	−0.011	−0.013	0.026	0.027
	(0.020)	(0.020)	(0.002)	(0.002)	(0.001)	(0.001)	(0.008)	(0.008)	(0.021)	(0.020)
X ELL	−0.021***	−0.013***	−0.010***	−0.005***	−0.003***	−0.001**	−0.004***	−0.001	−0.004***	−0.006***
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)
X Male	0.001**	0.001*	0.001***	0.001***	0.000*	0.000*	−0.000	−0.000	0.000	0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
X Hybrid (district)	−0.004		−0.005***		0.003**		0.000		−0.002	
	(0.003)		(0.001)		(0.001)		(0.001)		(0.003)	
X Remote Only (district)	−0.004		−0.005***		0.005***		0.003*		−0.007	
	(0.003)		(0.001)		(0.001)		(0.002)		(0.004)	
Constant	0.021***	0.028***	0.002***	0.004***	0.002***	0.003***	0.006***	0.008***	0.012***	0.014***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
School FE and	N	Y	N	Y	N	Y	N	Y	N	Y
School FE × PostCOVID										
N	3,827,059	3,883,322	3,827,059	3,883,322	3,827,059	3,883,322	3,827,059	3,883,322	3,827,059	3,883,322
R-squared	0.008	0.021	0.011	0.023	0.003	0.012	0.002	0.008	0.006	0.024

Notes: All regressions also include a linear time trend, indicators for 5 race/ethnicity categories (Black, Hispanic, Asian, Native American, Hawaiian; White is omitted), indicators for Economic disadvantage, Special Education status, Migrant status, English Language Learner, Male, Hybrid or both instruction and Remote only instruction (in-person only is omitted). Sample includes all students enrolled in Michigan elementary schools in October from 2014 to 2019. Status is as of October of the following year. Homeschool, private school, and other exit status are available for all students whose name is on the school roster in September. Students that do not appear on the roster in September are classified as unknown status. Sample size is smaller in odd columns because modality is not available for a small number of districts. Robust standard errors clustered by district in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

References

Abdulkadiroğlu, A., Pathak, P.A., Schellenberg, J., Walters, C.R., 2020. Do parents value school effectiveness? American Economic Review 110 (5), 1502–1539.

Ainsworth, R., Dehejia, R., Pop-Eleches, C., & Urquiola, M. 2020. Information, preferences, and household demand for school value added. National Bureau of Economic Research Working Paper 28267.

Azevedo, J.P., Hasan, A., Geven, K., Goldemberg, D., Iqbal, S.A., 2020. Learning losses due to Covid-19 could add up to $10 trillion. Brookings Institution.

Bailey, D.H., Duncan, G.J., Murnane, R.J., Au Yeung, N., 2021. Achievement gaps in the wake of Covid-19. Educational Researcher.

Bassok, D. & A. Shapiro. 2021. Understanding COVID-19-era enrollment drops among early-grade public school students. Brown Center Chalkboard. Retrieved August 13, 2021 from https://www.brookings.edu/blog/brown-center-chalkboard/2021/02/22/understanding-covid-19-era-enrollment-drops-among-early-grade-public-school-students/.

Bhatt, R., 2014. Home is where the school is: The impact of homeschool legislation on school choice. Journal of school choice 8 (2), 192–212.

Camp, A., & Zamarro, G. 2021. Determinants of Ethnic Differences in School Modality Choices during the COVID-19 Crisis. Annenberg Institute for School Reform at Brown University. EdWorkingPaper No. 21-374.

Campos, C., & Kearns, C. 2021. The Impacts of Neighborhood School Choice: Evidence from Los Angeles' Zones of Choice. *SSRN 3830628*.

Chatterji, P., Li, Y., 2021. Effects of COVID-19 on school enrollment. Economics of Education Review 83.

Chetty, R., Friedman, J.N., Hendren, and N., Stepner, M. 2020. Real-time economics: A new platform to track the impacts of COVID-19 on people, businesses, and communities using private sector data. NBER Working Paper 27431.

Dee, T.S., Huffaker, E., Philips, C., & Sagara, E. 2021. The Revealed Preferences for School Reopening: Evidence from Public-School Disenrollment. CEPA Working Paper No. 21.06.

Dee, T.S., Murphy, M., 2021. Patterns in the Pandemic Decline of Public School Enrollment. Educational Researcher.

Eggleston, C. & Fields, J. 2021. "Census Bureau's Household Pulse Survey Shows Significant Increase in Homeschooling Rates in Fall 2020," U.S. Census Bureau.

Engzell, P., Frey, A., Verhagen, M.D., 2021. Learning loss due to school closures during the Covid-19 pandemic. Proc. Natl. Acad. Sci. 118 (17).

Hanushek, E. A. and L. Woessmann 2020. The economic impacts of learning losses.

Hastings, J.S., Kane, T.J. and Staiger, D.O. 2005. Parental preferences and school competition: Evidence from a public school choice program. National Bureau of Economic Research Working Paper 11805.

Houston Jr, R.G., Toma, E.F., 2003. Home schooling: An alternative school choice. South. Econ. J., 920–935

Kuhfeld, M., Soland, J., Tarasawa, B., Johnson, A., Ruzek, E. and Liu, J. 2020. Projecting the potential impacts of COVID-19 school closures on academic achievement. Annenberg Institute Working Paper 20-226.

Murnane, R.J., Reardon, S.F., 2018. Long-term trends in private school enrollments by family income. AERA Open 4 (1).
Thakur, N., Lovinsky-Desir, S., Bime, C., Wisnivesky, J.P., Celedón, J.C., 2020. The Structural and Social Determinants of the Racial/Ethnic Disparities in the US COVID-19 Pandemic. What's Our Role? Am. J. Respir. Crit. Care Med. 202 (7), 943–949.
Walters, C.R., 2018. The demand for effective charter schools. Journal of Political Economy 126 (6), 2179–2223.
Wang, K., Rathbun, A., and Musu, L. 2019. School Choice in the United States: 2019 (NCES 2019-106). U.S. Department of Education. Washington, DC: National Center for Education Statistics.