

Appendices

Appendix A. Generalized Synthetic Control, by Grade Band

Generalized Synthetic Control

To corroborate the findings of our differences-in-differences estimations, we explore the robustness of our grade-band findings by using a Generalized Synthetic Control (GSC), which allows for multiple treated units and flexible treatment effect heterogeneity (Dee et al., 2023). We find that our GSC provides complimentary evidence of our findings above. In Table 10, the results of our overall GSC estimates suggest a negative and significant overall impact of distanced education (beyond the impact of the pandemic) that closely matches our overall difference-in-differences results. We also present the results of grade band estimation, as we do for our difference-in-differences models above. Again, we see a negative and significant decline amongst the youngest grades, though with a lesser magnitude. We believe this is likely due to the shifting funding landscape across the state, but also likely due to our limited sample size. We find some evidence of increases in enrollment in high schools, which is consistent with our models above and statewide reporting.

Category	Grades PK-12	Grades PK/K	Grades 1-5	Grades 6-8	Grades 9-12
<i>Generalized Synthetic Control</i>	-0.050*** (0.000)	-0.174*** (0.019)	-0.009 (0.331)	0.003 (0.267)	0.240 (0.366)

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Appendix B. Data and Sample Information

District Information

In our data collection, we define a “reopening plan” as a document or set of documents, or other official communications, from district or school leadership, that outlines instruction method, school reopening strategy, and safety precautions available to students and families on the first day of the fall 2020 semester.

Using the Missouri Department of Elementary and Secondary Education’s (DESE) school directory and information from the reopening survey described above, two research assistants verified district websites and first dates of school. We cataloged district information in a spreadsheet containing: first day of school, main district websites (not COVID-19 related), and district Facebook pages. If no district website was provided or the link did not work, we Googled the district name with “school district MO.” To ensure we found the correct website, we cross-verified with DESE information on record.

In Missouri, often districts communicated through Facebook, therefore, we checked district websites to see if a Facebook link was available. If none was provided, we Googled the district name and “school district MO Facebook.” Following a similar process as the main district webpages, we looked at the contact information and compared it to the DESE school directory to verify we found the correct page. If a district had multiple Facebook pages, all were included in the spreadsheet. Some did not have district-wide Facebook pages but instead had pages for individual schools

(mostly smaller districts with only one or two schools). If there was no district Facebook page, we again checked the district website to see if we could locate Facebook pages for one or more schools and included them if available. The completed spreadsheet contained district websites, Facebook pages, and first days of school for all districts in the state.

Downloading Sampled District Plans

For around 80% of Missouri students, the fall 2020 semester began the week of August 24. Between August 17 and October 7, we refined a collection procedure to gather and catalog information within district reopening plans. Following a pilot collection, we adjusted our procedure to account for information contained via Facebook, and to redefine terms that were ambiguous but frequently used across district information. We downloaded all documents from all districts within the timeframe above to ensure that we had collected the documents districts had published at the time of school opening and so that district documents did not reflect different stages in COVID response. Downloaded information included, but is not limited to, documents, videos, Facebook posts, flyers, or screenshots of district webpages.

Plans may not have referred to instructional or safety procedures consistently. In many cases, plans reflected “tiers” or “levels” of varying response based on the district risk assessments (which typically used idiosyncratic measuring methods to determine level or tier). Using information from district websites or Facebook pages, we verified which tier or level of plan a district used on day one of the fall 2020 semester and provided this information for all coders. These data reflect plans *only* for the first day of school, and do not speak to real changes or possible changes that may or may not have taken place following the first day of school.

For example, a district might have “Green,” “Yellow,” and “Red” levels or “A,” “B,” and “C” tier plans to deliver education, where the “Green” plan might detail the fewest operational and instructional changes in the district. Full accounting for plans (including these levels) can be found through the complete, publicly available data located: [link-removed-for-anonymity]

On district webpages, downloaders were instructed to search the home page for any of the following: news feed, update feed, letters from principals or superintendents, and direct links or tabs for COVID-19 information. If any of those sections were available, downloaders first followed the links to find district reopening documentation. In addition, or if any of those pages were not available, downloaders either used district search features or Google search (within the district site—e.g., [SEARCH TERM] site:[district website]) for the following terms: COVID, COVID-19, coronavirus, reopening, re-entry, and plan.

Downloaders were instructed to follow links to any additional pages on COVID-19 and/or reopening for fall 2020, and information from spring 2020 closures were excluded. Screenshots were taken of any information that was unavailable for download. All documents were saved to unique district folders with the date it was last updated. Document dates were critical, as coders used the most recent evidence to make final decisions when coding. Date downloaded was also tracked in a spreadsheet during the process.

After completing a search of district websites, downloaders used the verified links to search the district Facebook page(s), if available, for relevant information. We saved (screenshotted) any post related to COVID-19 reopening that was posted after July 1, 2020. Similar to district documents, all Facebook posts were saved with the post date. We did not include images from Facebook in district files or when coding district plans. Though some Facebook posts from districts could give the appearance of social distancing or mask mandates, images may not capture district-wide policy, so they were excluded from our saved information. Videos were included so long as the information discussed within the video represented district-wide policy.

We compare our sample of 191 districts with an earlier survey of district reopening plans conducted by Missouri's DESE. In August 2020, DESE opened the 2020-21 Start of School Questionnaire which collected information about district start dates, planned instructional approach for the first day (e.g., in-person, distanced, hybrid), enrolling students, technology access, etc.

Districts in our sample were more likely to be distanced only (20.4% v. 10.2% statewide) or hybrid (15.2% v. 8.9% statewide) and less likely to be in-person only (19.4% v. 33.5% statewide). This is a result of our sampling strategy, which oversampled from the state's metropolitan areas. This oversampling of urban districts, which were more likely to start the year with distanced instruction, allows us to more precisely estimate the impact of switching to distanced instructional delivery.

Appendix C. Coding Questionnaire

Many of the questions we used were directly from, or adapted from, the work from the Center for Reinventing Public Education. After coding training and discussions about proposed questions, we limited the final questionnaire to 26 questions. We made use of indicator (yes/no) questions to identify districts with any (or no) evidence of a particular item, with plans to delve deeper in analysis with the use of coding and tiebreaking evidence spreadsheets. For complete details on the sources of survey items and how they were adapted, please view the data online with the accompanying codebook here: <https://www.sluprime.org/content-analysis>.

Appendix D. Training & Decisions

Prior to beginning training and coding, we created individual district folders to house reopening documentation from district websites. Documents in the folders fit the study's criterion of being posted before the first day of school (specific to each district) and other elements of the study's methodology (described above in "Downloading Plans").

To prepare for the content analysis, we led coders through two weeks of coding training and practice using example district reopening plans and our questionnaire. We used plans from our initial review of districts and attempted to expose coders to a wide range of potential plans, from those with little information, to those with multi-page documents and lots of detail. These training sessions allowed coders to become familiarized with plan documents, and in our group meetings, we walked through the plans and discussed definitions, notetaking, and decision rules in detail. After two sessions of walkthrough examples, we began a three-round trial coding process. During each round of the trial coding periods, we again selected a subset pre-screened school districts that highlighted different styles of reopening plans.

To code each district (in trial & final coding), coders were provided with a few pieces of information: 1) folders containing district reopening documents; 2) a spreadsheet listing their assigned districts, first days of school, Facebook links, and first-day instructional plan or color-code level, if available; and 3) a spreadsheet with all coding questions and columns for each assigned district. The latter served as evidence documents. In addition to documenting responses for their assigned districts, coders also provided evidence for their coding decision, such as a document name and page number. The evidence was critical later in facilitating tiebreaking decisions. In addition to documenting responses on evidence spreadsheets, coders also responded in a Qualtrics survey for each district.

Coders were instructed to only use documents or videos provided in each district's folder and information from district Facebook pages. Eligible Facebook information included any posts

from July 1, 2020 through the first day of school (inclusive). Coders used both district files and Facebook posts, along with dates of both, to inform their decisions. For any discrepancies between documents, coders were instructed to use the most recent information (e.g., new information or posts would supersede older ones). Facebook photos were not included in the protocol.

Following each week of the trial coding period, coders debriefed as a group to discuss decision making and resolved ties between reopening plans. With the exception of debriefing after a trial coding period, coders followed the same process and procedures when coding all school districts in our sample.

Coding training and trial coding served to streamline the final coding questionnaire and strengthen group consistency in coding. In coding training and trial discussions, we emphasized the importance of consistency in responses over “right” or “wrong” answers.

Appendix E. Tiebreaking

Each district was coded by two coders, with sets of district reopening plans coded and discussed each week. Flagged questions (items of disagreement) were highlighted for additional review by a third coder, or tiebreaker. Observations from the first round of tiebreaking shaped team conversations around coding questions, likely helping strengthen the consistency in responses moving forward. If coders were concerned about any previous answers after these discussions, they flagged them for additional review and were handled in tiebreaking.

We completed tiebreaking for the rest of the districts in three sets after Week 5. Tiebreakers met after the first two weeks to discuss common questions, issues, and items needing clarification. Questions 11, 19, 20, and 24 had more inconsistent responses than the other items, even in the tiebreaking discussions. To address potential issues, tiebreakers went back and looked at the evidence for these questions (11, 19, 20, and 24) for all districts, even if the coders agreed. As the Week 1 tiebreaker did not have the benefit of these conversations, the later tiebreakers also went back to the four questions (11, 19, 20, and 24) for districts coded in Week 1.

The average percentage agreement across all districts was 84% and individually, by district, ranged from 52% to 100%. By week:

Week	Percentage Agreement
1	85%
2	82%
3	81%
4	87%
5	85%

The average percentage agreement does not take into account agreements that occurred by chance. To determine the consistency of the various rates, we first calculated the percentage of time that the raters agreed in their ratings. Here, we provide inter-rater reliability (IRR) in which we did not adjust weights, but we did take the absolute value when the IRR was negative. Our average IRR was 0.537, with slight improvements over the coding weeks as follows:

- Week 1: 0.523
- Week 2: 0.567
- Week 3: 0.554