Journal of
Risk and Financial Management

MDPI

Article

Financial Stress and Health Considerations: A Tradeoff in the Reopening Decisions of U.S. Liberal Arts Colleges during the COVID-19 Pandemic

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Abstract: This paper presents empirical evidence on factors influencing choices made by members of the Annapolis Group of Liberal Arts colleges regarding whether to operate primarily in-person, primarily online or some flexible alternative during the COVID-19 pandemic of 2020. This paper examines the tradeoff between public health risks and financial standing that school administrators faced when deciding reopening plans. Because in-person instruction at colleges and universities had large effects on COVID-19 case rates, it is critical to understand what caused these decisions. We used binary and multinomial probit models to evaluate an original data set of publicly available data as well as data from the College Crisis Initiative. Binary and multinomial choice model estimates suggest that conditional upon the prevailing level of COVID-19 in their county, financially distressed colleges were approximately 20 percentage points more likely to opt for primarily in-person operations than less financially distressed colleges. These choices highlight an important potential tradeoff between public health and financial concerns present in the higher education sector and emphasize the need for public spending to mitigate adverse health outcomes if a similar situation occurs again.

Keywords: COVID-19; colleges and universities; financial stress; public health

Citation: Tobin, Jonah, Oliver Hall, Jacob Lazris, and David Zimmerman. 2021. Financial Stress and Health Considerations: A Tradeoff in the Reopening Decisions of U.S. Liberal Arts Colleges during the COVID-19 Pandemic. *Journal of Risk and Financial Management* 14: 382. https://doi.org/10.3390/jrfm14080382

Academic Editor: María-Dolores Guillamón

Received: 22 July 2021
Accepted: 12 August 2021
Published: 17 August 2021

1. Introduction

During the summer of 2020, colleges and universities faced the challenging and unprecedented task of evaluating the risks associated with COVID-19 and subsequently deciding whether they should open their campuses for in-person learning during the fall semester. Using a limited amount of information to predict a very uncertain future, many institutions elected to close their campuses almost entirely and transition to online learning. Others decided that bringing students back would be best. Still others proposed a moderate approach, only allowing some combination of students in select grades and students facing select circumstances to learn in-person. As of 9 September 2020, The College Crisis Initiative at Davidson College reported the reopening plans of the 2958 colleges, community colleges, and universities in the United States (C2i 2020). Figure 1 below uses their data to demonstrate the variation in decisions made by institutions of higher education (descriptions of each classification can be found on The College Crisis Initiative's website).

As the aforementioned data illustrate, there was no one protocol embraced by all U.S. postsecondary schools; rather, vastly different reopening strategies were employed depending on the institution. In this paper, we focus on the decisions made by the 123 members of the Annapolis Group of Liberal Arts colleges and use an original data set to answer the central question: *what were the relative roles of economic and public health considerations*

in determining if, and to what extent, a given U.S. Liberal Arts college elected to bring its students back to campus for in-person instruction? In particular, we focus on the roles of the prevailing COVID-19 health risks and the financial condition of the college at the time the operational decision was made. These factors were likely at the forefront of any school's decision-making process and capture a potentially important tradeoff between public health objectives and financial objectives.

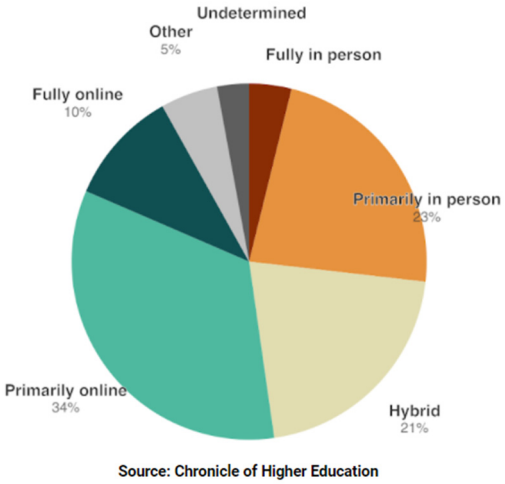

Figure 1. Variation in Fall 2020 Reopening Plans of U.S. College and Universities.

By narrowing the sample to the Annapolis Group, we form a more homogenous subset of colleges that enables us to compare across institutions and isolate the ceteris paribus effects of health risks and financial standing. The 123 schools are private institutions focused on undergraduate teaching and with similar decision-making processes. They largely lack graduate programs and large athletic revenues and have a high percentage of on-campus housing so their costs, revenues, and risk of transmission are similar. To calculate the tradeoff between economic and public health considerations for Annapolis Group institutions, we constructed an original data set using data from the College Crisis Initiative's report on school reopening as well as publicly available demographic data for each institution. This was combined with indicators of financial strength such as the endowment per student, Zemsky financial stress score, and Forbes College Financial Health Grade. Lastly, data describing the risk of transmission on campus were added to reflect the public health risk of bringing students to campus. This included percentage of students in on campus housing, the population density of the surrounding county, and the 7-day average of new COVID-19 cases per day per 100,000 residents. We then use binary and multinomial probit models to estimate the relative importance of financial and public health considerations. Each model begins with public health variables, and then financial variables are added, followed by additional covariates with the primary aim of identifying the role of financial circumstances in schools choosing whether or not to reopen their campuses.

This paper contributes to a growing body of literature that reflects on the decisions made by university administrators when navigating the COVID-19 pandemic. While many organizations impacted case rates, colleges' reopening choices had a particularly large effect on the public health outlook of the country. Indeed, recent research concludes that choices made by colleges and universities to engage in in-person instruction have resulted in a daily increase of over 6500 COVID-19 cases nationwide (Andersen et al. 2021). Our findings indicate that financial stress may have caused many schools to bring students back to campus. The tradeoff between public health and institutional financial concerns suggests a potential role for policy makers.[1] If faced with similar circumstances again, government officials may use this paper's findings to create financial packages that incentivize safer reopening models or increased on-campus health measures.

2. Literature Review

Our analysis of the institutional decision-making processes surrounding Fall 2020 reopening builds on a small but growing body of literature on the topic. A number of researchers at different universities have approached this issue using a variety of analytical frameworks and statistical methods. The findings, although very new, have consistently pointed to factors outside pandemic severity as the most important variables in a college or university's decision to conduct in-person learning. This is quite worrying, especially considering the very real effects that college reopenings have had on the prevalence of COVID-19 in their surrounding cities or towns.

An important subset of the literature on college reopenings during the COVID-19 pandemic focuses on the public health effects of in-person learning. In September 2020, a group of medical researchers published a study detailing that the presence of students back on campus for in-person instruction led to approximately 2.7 additional daily cases per 100,000 residents (Andersen et al. 2021). For context, this translates to 6500 additional daily cases nationwide. The paper, which used cell phone location data along with local COVID-19 rates, finds that in-person instruction was associated with higher mobility rates on reopened campuses and in their surrounding communities. This mobility rate, in turn, led to an increased rate of COVID-19 transmission. While some of the additional cases can be attributed to students' travel from higher-incidence areas to campus, the fact that case counts remained high for more than two weeks after arrival supports the idea that in-person learning affected the epidemiological landscape of college towns in a lasting manner. Importantly, the study also concludes that colleges that brought students back to campus but conducted classes remotely did not have nearly the same effect on case counts in the area (1.5 fewer daily cases per 100,000 than the in-person colleges). These findings add weight to the discussion of institutional decision making. Colleges, far from existing in a vacuum, have a reciprocal relationship with the cities and towns in which they are located. If there truly exists a causal relationship between decisions to reopen for in-person learning and the observed 2.7 increase in daily cases per 100,000 people, then it is even more crucial that the factors contributing to that decision type are carefully analyzed.

To do so, a few researchers have focused on state-and-county-level sociopolitical factors to understand reopening decisions. This is based on the fact that Democrats and Republicans hold divergent views on the dangers of reopening campuses: when polled, 74% of Republicans believed that colleges were making the right decision to reopen while only 29% of Democrats felt this way (Parker et al. 2020). This partisan difference in a subjective understanding of the danger of the pandemic had concrete effects. Studies have found a statistically significant association between a higher statewide incidence of college reopening and a Republican governor (Collier et al. 2020, 2021). This suggests that the state political climate did in fact play a role in colleges' decision-making processes. While it is easy to see how public schools might be affected by state partisanship through appropriations pressure, these same studies found that private institutions were also affected by state-and-county wide partisan tendencies. This hints at a more cultural aspect to partisanship: the statewide prevalence of a certain subjective understanding of danger affected private schools' decision making, regardless of whether they were directly pressured by the government to open or remain closed.

This disparity between public and private schools' reopening decisions is explored in a working paper by a team associated with C2i (Collier et al. 2021). The authors use a structural model and find that four-year private schools, four-year public schools, and two-year public schools were all significantly influenced by state sociopolitical features in their decisions to reopen. Of the three categories, four-year public schools were the most affected. However, only four-year private schools were significantly influenced by a measure of the pandemic's severity. This suggests that the institutional decision-making process (especially for public schools) was skewed away from public health considerations and towards considerations of partisanship and subjective understandings of danger. There

is, however, some reason to believe that there was enough insulation from political pressure for four-year private schools to make a decision according to public health risks.

By analyzing four-year private liberal arts colleges, we seek to dig deeper into the financial aspects of pandemic decision making within a context that is uniquely shielded from the significant pressures of state and local politics. In doing so, we build on other work examining revenue motives. Castiello-Gutiérrez and Whatley (2021) explore this idea using the proportion of international students enrolled at a school as a predictor variable for opening decisions. This model is based on the fact that international students generally pay more in tuition than their domestic counterparts. In finding that schools with a higher percentage of international students were more likely to reopen, Castiello-Gutiérrez and Whatley establish that schools' decisions were motivated in part by the desire to secure tuition revenue. Felson and Adamczyk (2021) also examine financial incentives by connecting a lower endowment per student with an increased chance of reopening. In our analysis, we seek to build on this by focusing solely on four-year private liberal arts colleges, which are subjected to less political pressure than public schools (Collier et al. 2021). In addition, we introduce targeted measurements of financial health that capture financial stress along with institutional wealth in an attempt to account for a more comprehensive effect of financial incentives on the reopening decision. By narrowing in on this specific aspect of the decision-making process, we hope to uncover insights that are lost in broader analyses. Ultimately, this paper aims to capture the effects of financial incentives on the reopening decision in a way that prepares policy makers to act should we experience a similar crisis in the future.

3. Materials and Methods

In the summer of 2020, the COVID-19 pandemic presented colleges and universities with a highly complex decision regarding their upcoming academic year. In principle, they could, at least, try to reopen in-person as usual. Alternatively, they could adopt one of a variety of operational strategies ranging from mostly in-person through primarily or fully online. In the extreme, they could shut down for the fall semester. Presumably, the calculation on how to proceed was informed by comprehensive cost–benefit analyses in which institutions weighted the expected benefits against the expected costs associated with each alternative. Importantly, those decisions were made against a backdrop of vast heterogeneity in institutional missions and wealth, differing institutional trends in student applications and yield rates, and varying levels of COVID-19 risk. Further, schools are located in areas that, at the times of their decision-making processes, expressed different subjective assessments of the risks associated with COVID-19. This suggests that schools facing similar assessments of the possible benefits and costs associated with each operational alternative might assign different probabilities to the underlying benefits and costs and, as a result, might opt for different strategies. In summary, schools were facing a nearly unprecedented shock with the stakes being considerably higher for some schools than for others. The anticipated institutional risks from the shock varied due to institutional level differences in the interaction between objective circumstances and subjective reasoning.

To illustrate, the following shows some key factors entering into the operational decision for the in-person versus all-remote options:

In-person net operating revenue:

$$\underbrace{\alpha_o E_o}_{\text{Avail from Endowment}} \underbrace{+\sum_{i=1}^{N_o}\left(P_{io}-A_{io}\right)}_{\text{Net Tuition revenue}} \underbrace{+\sum_{i=1}^{N_o} R_{io}}_{\text{Room and Board}} + \underbrace{Aux_o}_{\substack{\text{Auxiliary Revenue}\\ \text{e.g. athletics, conferences,}\\ \text{rented space, etc.}}} - \underbrace{DI_o}_{\substack{\text{Directed and indirect}\\ \text{operating costs}}} - \underbrace{Covid_o}_{\substack{\text{Testing, isolating,}\\ \text{technology, etc.}}} - \underbrace{C_0}_{\text{health costs}} \quad (1)$$

Fully remote net operating revenue:

$$\underbrace{\alpha_c E_c}_{\substack{\text{Avail from}\\ \text{Endowment}}} \underbrace{+\sum_{i=1}^{N_0}\left(P_{ic}-A_{ic}\right)+}_{\text{Net Tuition revenue}} \underbrace{DI_c-}_{\substack{\text{Directed and indirect}\\ \text{operating costs}}} \underbrace{Covid_c}_{\substack{\text{Testing, isolating,}\\ \text{technology, etc.}}} \quad (2)$$

Equation (1) shows the anticipated benefits and costs of the fully in-person option as being the difference between revenue in-flows comprised of avail from any existing endowment, net tuition revenues (sticker price minus financial aid summed for all students) and revenues from room and board and other auxiliary activities minus direct and indirect operating costs and minus the costs of instituting precautions against COVID-19 infections and a monetized impact of any resulting health/reputational costs to the college and the surrounding community.

Many of these variables would be of uncertain magnitude. For example, the number of students choosing to return to campus—should that be an option—could be large or small. Further, the number of tuition-paying students in the fully remote scenario would also be uncertain. Those numbers would likely depend on a variety of institutional policy choices, which may be affected by student beliefs about the relative health risks of returning to campus versus staying at home. That risk assessment would depend on their beliefs regarding the likely efficacy of the extent and type of COVID-19 testing/monitoring/etc. employed at the school and the prevalence and trends of COVID-19 in the surrounding area compared to their home locations. It would also depend on other COVID-19-related educational and extracurricular changes, including the availability of in-person classes, housing, dining, sports and recreational opportunities. Mental health concerns could also be paramount as some students might fear the health risks of returning to campus and others might feel a strong need to return to a more normal educational experience. It would also depend on other student characteristics—whether, for example, the school had a significant enrollment of international students who would require a student visa to return to campus.

Importantly, there would be significant institutional heterogeneity in the importance of the variables in Equations (1) and (2). Schools with large financial endowments would be less dependent on tuition revenue to cover operating costs. They would, of course, still be subject to any financial shocks that could deplete their endowments or reduce gifts and impact what they could prudently avail from their endowments during this period. Further, they might differ in the relative liquidity of their financial assets and in any penalties that might be imposed to access funds. Schools would also differ on the relative importance of residential versus off campus housing. Under the fully remote scenario, colleges would not receive revenue for room and board and their housing stocks would remain vacant. Under the fully in-person option, they would receive payments for room and board but could also incur additional costs in retrofitting living arrangements to mitigate health risks. Similarly, schools opting to shut down would forgo revenues from athletics operations, catering, conferences, etc., and other sources of auxiliary revenue. For schools with large athletics programs, shutting down would remove the option of revenue for those activities should athletics competitions resume. It would also be possible, of course, that auxiliary activities would need to be significantly curtailed under the fully in-person scenario. Schools also differ in their direct and indirect costs. Importantly, schools have different levels of flexibility with regard to labor costs. For example, schools with a higher proportion of adjunct faculty could more easily scale back their curricular operations than schools with mostly tenure track faculty. Shutting down could allow some employment to be furloughed or downsized in a less than fully in-person scenario. Other staff, such as those in information technology operations, might grow under many options. Resources to expand mental health support services for students, faculty, and staff could create additional budgetary demands under remote, in-person, or hybrid operational scenarios.

Given the evolving nature of the pandemic, decision makers would be cognizant of the risks that COVID-19 cases could escalate. Schools have different access to medical facilities as well as different capacities for isolating infected students, and serious outbreaks could require a shift to a different operational mode. Further, if the outbreak appeared to reflect negligence in planning or prevention, the school could be vulnerable to financial liabilities or damage to its "brand". These potential costs are captured by the C term in Equation (1). Shifting to an all-remote option would negate this risk, though a school may also be criticized for fear mongering if the health costs turned out to be less than anticipated. A school might attempt to mitigate criticism of either excessive or inadequate caution by adopting a coordinated approach with its institutional peers. This would provide the institution with a more easily defended response should predictions regarding health risks prove inaccurate. Finally, the choice to reopen or not would consider the impact on the local community. College towns, by definition, have local businesses that depend on their surrounding student populations to survive. College students would also depend on local hospitals and health clinics. The presence of large numbers of students in a community might be seen as elevating the risks of contagion as well as potentially creating competition for scarce health resources.

We suspect that for most institutions, the default choice was to reopen. After all, each institution likely had a strong desire to pursue its academic mission in the usual manner. The costs would have to be perceived as sufficiently high or the benefits sufficiently low that they would opt for something less than a full reopening. They would likely regard this result as a regrettable but necessary compromise with inferior results in achieving their institutional mission. In light of the framing above, greater institutional wealth would reduce pressure to obtain additional revenues that might come from in-person options. It also would provide the resources that would allow a comprehensive mitigation strategy that would increase the probability of a successful in-person semester. Other things equal, schools with the least wealth and therefore highest reliance on tuition revenues would face the greatest pressure to reopen. They would face a challenging set of choices on how to allocate their resources between educational and COVID-19 mitigation objectives. That pressure would be heightened for schools facing additional stresses—declining enrollment or yield, for example, along with limited non-tuition revenue. They might, in effect, be fighting to survive. Schools with significant sources of auxiliary income might favor opening to maintain the option of securing those revenues. Similarly, schools located in areas with lower rates of COVID-19 and less threatening infection trends would be more likely to open. Finally, decision makers may themselves have or be located in communities with different subjective assessments of the risks associated with COVID-19 and reopening.

In sum, we would expect schools on the financial margin to be driven to make tradeoffs between health risks and the institution's economic viability. The magnitude of the tradeoff would depend on the decision-making environment's subjective assessment of the prevailing health risks related to COVID-19.

Our primary data source was The College Crisis Initiative's (C2i) data set capturing the reopening plans of colleges and universities. We focus on the subset of 123 schools that are members of the Annapolis Group of Liberal Arts Colleges. This subsample of schools shares a more homogenous mission and educational production process. They are predominantly residential colleges with an emphasis on undergraduate teaching. According to the U.S. News and World Report ranking system, they make up 114 of the top 150 liberal arts colleges in the United States. They do not operate large (or any) graduate programs. Their athletic programs do not create significant revenues. Their operating costs have a significant labor share. The schools used in our analyses along with their chosen operating mode is presented in Appendix A. Figure 2 provides information about the location of the 123 colleges to illustrate some of the diversity among the membership institutions.

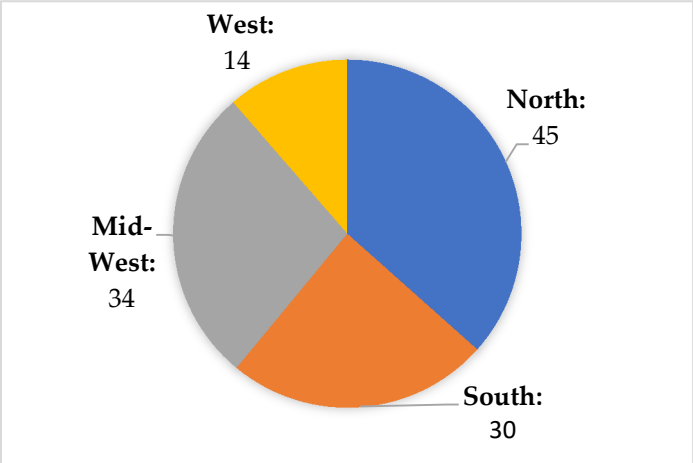

Figure 2. Location of Colleges in the Annapolis Group by Census Defined Region of the U.S. by Count.

We supplemented the C2i data with a variety of variables capturing the COVID-19 landscape and the financial health of the schools at the time they made their operational choice for the fall 2020 semester. To define whether or not a college was open, we followed C2i's quantification of each school's reopening plan. In particular, we created a binary dependent variable that characterized schools as fully or primarily open (1) or not (0). This designation sought to capture whether students in all grades were granted the option to return for in-person instruction. In addition, we created a scaled dependent variable (0–2) in order to examine a wider range of options in a multinomial probit model. This variable labeled fully or primarily online schools as online (0), hybrid schools as flex (1), and fully or primarily in-person schools as open (2).

The variables used in our analyses are presented in Appendix B. In particular, we use a variety of measures to capture the financial strength of schools in our sample including their respective: endowment per student, Zemsky financial stress score, Forbes College Financial Health Grade, and US News and World Report National Liberal Arts Colleges ranking. Endowment per student is a common measure of the primary resource available for an institution to supplement its operating budget over and above its tuition revenue (NACUBO 2020), (Chronicle of Higher Education 2019). Schools with lower endowments per student are more reliant on tuition revenues to fund operations. The Forbes College Financial Health Grade assigns a letter grade (A through D) to schools indicating their financial health (Coudriet 2019). The measure is a weighted average of each school's endowment per student and the fraction of the operating budget supplied by tuition, along with measures of liquidity (including its Primary Reserve Ratio and Viability Ratio), operating margin (a measure of surplus revenues), return on assets, its admissions yield, the percent of first-year students receiving institutional aid (which can measure financial aid or strategic price discounting), and the fraction of expenses that are devoted to instructional purposes. Schools receiving a lower grade are typically more dependent on tuition for funding their operations or have relatively illiquid endowment resources. They may also be facing market challenges or suppressed revenue growth. All of these would present challenges should the school be forced to make changes that lower their revenues or raise their costs. We also use a similar measure of financial strength developed by Zemsky et al. (2020). The Market Stress Test Score for the schools in our sample was taken directly from a Hechinger Report article on the financial dangers of the COVID-19 pandemic (Butrymowicz and D'Amato 2020). Colleges were given a stress rating of 1 if they fell below the 20th percentile in terms of enrollment trends, endowment, student retention, or tuition discounting during the fall of 2019 and a higher rating of 2 or 3 if they fell below the 10th or 5th percentiles in these measures. We utilize the comprehensive Zemsky score developed in Hechinger and code the resulting Zemsky index as one if the school

is designated as being under stress in any of the underlying categories. In addition to these variables, we use the US News and World Report ranking as a measure of the overall status of the institution (U.S. News and World Report 2020). We include a measure of the fraction of students in college-operated housing—a proxy for the financial impact of forgone room and board revenue should the college opt not to reopen its campus. We also include a measure of the percentage of the faculty that is tenured or tenure-track (College Factual 2020). A school with a higher percentage of tenured faculty would face less budget flexibility, effectively having a larger portion of its costs fixed in the short run. That would limit its ability to reduce labor costs by closing the campus.

In measuring the public health context, we incorporate several variables related to the risk of viral transmission at a school. Specifically, we include the percentage of students who live on campus (NCES 2020), the population density of the county in which the school is located (U.S. Census 2020), and the number of COVID-19 cases per 100,000 residents in that county on the date that the school made its reopening decision (USAFacts 2020), (Brown School of Public Health 2021). All of these variables increase the risks associated with a viral outbreak should the college choose to operate fully or primarily in-person. We code the COVID-19 case variable as per the Harvard Global Health Institute (Aubrey and Worth 2020):

Low Risk (Green) <1 daily new cases per 100,000 people in county on average in the preceding week

Medium Risk (Yellow) 1–9 daily new cases per 100,000 people in county on average in the preceding week

High Risk (Orange or Red) >10 daily new cases per 100,000 people in county on average in the preceding week

Finally, to capture the variation in the subjective risk ascribed to COVID-19, we use a measure of the political leaning of the school's county. To quantify political leaning, we report the percentage of people who voted for Donald Trump in the November 2020 election (New York Times 2020). We code this variable as one if a majority voted for Trump and zero otherwise. While we recognize that this variable may have been affected by the presence or lack of students on campus in each county, we, nonetheless, think that this percentage adequately captures the overall political climate of the county, potentially having an effect on the likelihood of a postsecondary school reopening. The binary characterization of the Trump variable captures the two-party political system dominant in the United States and the political power resulting from a majority. It is intended as a proxy for the county's support for policies aimed at deterring the spread of COVID-19 (including mask wearing, vaccination, business shutdowns) and is consistent with other literature in this topic area. Political homophily at the county level is a dominant feature of the American political landscape. Indeed, in our data, in counties with a majority voting for Trump, on average, over 61% of the voters voted for Trump, while in counties without a Trump majority only approximately 37% voted for Trump.

Descriptive statistics for our sample are in Table 1 below:

Table 1 shows that approximately 61.8% of the schools in our sample chose to be fully or primarily in-person in the Fall semester of 2020. The Forbes rating is coded as dummy variables FA (schools with an A−, A, or A+ rating), FB (schools with an B−, B, or B+ rating), or FC_D (schools with a rating of C+ or lower). Endowment per student is divided into quartiles (ETQ for the top quartile, EBQ for the bottom quartile, and EM50 for the middle 50% in the distribution). Similarly U.S. News and World Report Rankings are divided into the top25 (USNWRT25), those ranked 75 or lower (USNWR75up) and those missing (USNWRM) or those ranked between 26 and 74 (USNWR2674). We see in Table 1 that approximately 38% of the schools in the sample were flagged as under financial stress by the Zemsky index. Further, approximately 36% of the schools were located in counties where a majority voted for Donald Trump in the 2020 presidential election.

Table 1. Descriptive Statistics.

	Mean	Std. Dev.
openb	0.618	0.488
Low Risk	0.203	0.404
Medium Risk	0.48	0.502
High Risk	0.317	0.467
FA	0.244	0.431
FB	0.415	0.495
FC D	0.341	0.476
Endowperstudent	261.968	290.035
ETQ	0.244	0.431
EBQ	0.252	0.436
EM50	0.504	0.502
USNWRT25	0.179	0.385
USNWR2674	0.358	0.481
USNWR75up	0.39	0.49
USNWRM	0.073	0.261
Zemsky	0.382	0.488
Popdensity	0.406	1.214
Enrollment	1829.899	673.079
Studenthousing	85.585	12.944
Tenuredfac	59.654	15.524
Trump	0.358	0.481
Number of Observations	123	

Table 2 presents descriptive statistics conditional on whether the school chose to be fully or primarily in-person (openb = 1) or primarily online (openb = 0).

Table 2. Descriptive Statistics: Conditional Means on Openb = 0 or 1.

	Fully or Primarily Online		Fully or Primarily In-Person	
	Mean	sd	Mean	sd
openb	0	0	1	0
Low Risk	0.085	0.282	0.276	0.45
Medium Risk	0.404	0.496	0.526	0.503
High Risk	0.511	0.505	0.197	0.45
FA	0.277	0.452	0.224	0.419
FB	0.532	0.504	0.342	0.478
FC D	0.191	0.398	0.434	0.499
Endowperstudent	356.897	372.364	203.262	206.531
ETQ	0.319	0.471	0.197	0.401
EM50	0.553	0.503	0.474	0.503
EBQ	0.128	0.337	0.329	0.473
USNWRT25	0.213	0.414	0.158	0.367
USNWR2674	0.468	0.504	0.289	0.457
USNWR75up	0.298	0.462	0.447	0.501
USNWRM	0.021	0.146	0.105	0.309
Zemsky	0.255	0.441	0.461	0.502
Popdensity	0.446	0.396	0.381	1.516
Enrollment	1792.023	573.118	1853.322	730.769
Studenthousing	84.106	13.378	86.5	12.672
Tenuredfac	59.555	15.027	59.716	15.922
Trump	0.277	0.452	0.408	0.495
Number of Observations	47		76	

Here, we see that schools choosing in-person operations generally faced lower caseloads of COVID-19. Of the schools choosing the in-person option, only 19.7% were in high-risk

COVID-19 situations. Of schools choosing to be fully or primarily online, 53.2% were in high-risk situations. Similarly, 27.6% of the schools opting for in-person classes were in low-risk counties while only 8.5% of schools choosing the predominantly online option were in low-risk counties. Schools choosing the in-person option were also located in counties with lower population density but were similarly invested in student housing and tenured faculty. The choices did, however, differ on a variety of measures of institutional wealth and status. On average schools opting for full or primarily in-person instruction had fewer resources—a lower average endowment per student, a higher fraction of Forbes C or D ratings, and a higher proportion of schools being flagged for financial stress using the Zemsky indicator.

To isolate the ceteris paribus impact of the variables of interest, we estimate binary choice (probit) models specified as:

$$P(open = 1) = F(\beta X) \tag{3}$$

where X is a vector containing the COVID-19 caseload variables (low risk, medium risk, high risk is the baseline), a measure of institutional financial wellbeing—either bottom (EBQ) or top (ETQ) endowment per student quartile dummy variables (middle 70% as baseline), Forbes grade of A (FA) or C/D (FC_D) with B grade excluded for baseline, Zemsky Score (1 if under stress, 0 otherwise), or USNWR ranking (top 25 (USNWRT25) or 75+ (USNWR75up), middle 26–74 used as baseline). Additionally included are the population density of the county in which the school is located (Popdensity), the fraction of students in college housing (Studenthousing), and the fraction of the faculty that are tenured or tenure track (Tenuredfac). Finally, we include the Trump variable identifying counties in which a majority of the population voted for Donald Trump in the 2020 election.

For each of the financial health variables we estimate models that begin with just the public health variables, then add the particular financial variable being used, and then add additional covariates to the model. Our primary focus is on the role financial circumstances played in schools choosing whether or not to reopen their campuses in the Fall of 2020.

To extend our analysis, we also estimate multinomial probit models incorporating three operational options: primarily or fully in-person, flex/hybrid, or fully online. This allows us to investigate the additional operational margin that does not offer students the full option of returning to campus, but strives for a balance between financial and health considerations.

4. Results

We present binary choice models (openb = 1 or 0) that first estimate the impact of the COVID-19 environment in a school's county at the time of its reopening decision. We then incorporate a measure of its financial situation to the model. Next we incorporate variables capturing the potential risk of COVID-19 transmission in the surrounding county (Popdensity), a variable capturing potential losses related to vacant college housing (Studenthousing), and a measure of the flexibility in labor costs (Tenuredfac). Finally, we add a variable indicating the support for Donald Trump in the 2020 presidential election (Trump). Estimates for these binary choice models are contained in Table 3. The table presents the marginal effect associated with the given variable along with the hetoroskedasticity consistent (robust) standard error for the effect.

Table 3. Probit Models Using Endowment per Student Quartiles (Marginal Effects).

	(1)	(2)	(3)	(4)
	Openb	**Openb**	**Openb**	**Openb**
Low_Risk	0.385 ***	0.376 ***	0.405 ***	0.409 ***
	(0.078)	(0.079)	(0.075)	(0.076)
Medium_Risk	0.278 ***	0.278 ***	0.276 ***	0.280 ***
	(0.094)	(0.095)	(0.095)	(0.098)
EBQ		0.216 *	0.334 ***	0.338 ***
		(0.099)	(0.094)	(0.096)
ETQ		−0.092	−0.168	−0.173
		(0.113)	(0.121)	(0.122)
Popdensity			0.0005	−0.0008
			(0.030)	(0.030)
Studenthousing			0.005	0.005
			(0.004)	(0.004)
Tenuredfac			0.007 **	0.008 **
			(0.004)	(0.004)
Trump				−0.028
				(0.111)
Observations	123	123	123	123
Pseudo R^2	0.095	0.133	0.174	0.174

Robust standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Results in column (1) indicate that a school was much more likely to reopen fully when its county exhibited a low or medium risk of COVID-19 at the time of its decision. Specifically, a school that was low risk was 38.5 percentage points more likely to open fully than a school classified as being at a high risk. Schools at medium risk were 27.8 percentage points more likely to reopen than its counterparts in orange or red risk environments. Column (2) incorporates measures of the schools endowment per student divided into bottom and top quartiles. The coefficients on COVID-19 risks are relatively unchanged. These estimates suggest that schools in the bottom quartile of endowment per student within the sample of Annapolis Liberal Arts Colleges were 21.6 percentage points more likely to opt to be fully or primarily open in the fall semester of 2020 compared to schools in the middle 50 percent of the distribution of endowment per student. Results in column (3) find a larger impact—with schools in the bottom quartile being 33.4 percentage points more likely to reopen. The coefficient for this variable is statistically significant at the 0.01 percent level. The only other variable that is statistically significant in column (3) is the variable on tenured faculty. The coefficient suggests that, ceteris paribus, a one percentage point increase in the proportion of tenure-track faculty raised the odds of opening by 0.7 percentage points. This result is consistent with the reduced budget flexibility associated with a more tenured faculty. It is also consistent with a more tenured faculty having a greater preference for reopening.[2] Finally, column (4) adds the Trump variable to the specification. In this model the marginal effects are very similar to those in column (3) and the Trump coefficient is not statistically significant. Thus, the political preferences in the schools county did not seem to play a role in reopening decisions after controlling for COVID-19 and financial risks facing the school.[3]

Table 4 presents models similar to those presented in column (4) in Table 3 but presents different measures of the schools financial situation. In particular, rather than using endowment per student as our measure of financial strength or weakness, we incorporate measures of the Zemsky Index of financial stress, Forbes Financial Health Rating, and the schools ranking in U.S. News and World Reports. Again, the table presents the marginal effect associated with the given variable along with the heteroskedasticity consistent (robust) standard error for the effect. Column (1) presents estimates using the Zemsky index of financial stress. In this model schools identified as being under financial stress are 18.4 percentage points more likely to reopen. No variables other than those associated with COVID-19 risks or the Zemsky rating are statistically significant. In column

(2) we see that schools with a Forbes rating of C or worse are 26.7 percentage points more likely to reopen than schools with a rating of B- to B+. Schools with a rating of A- to A+ do not make choices statistically different than those in the middle category. Other effects are similar to those in columns (1). Finally, column (3) presents estimates using the U.S. News and World Reports rank for the school. In this case we see that schools ranked in 75th or lower were 32.2 percentage points more likely to reopen than schools ranked from 26 to 74. Schools in the top 25 behaved similarly to those in the middle. In this model the coefficient for the percent of tenured faculty is significant with a one percent increase in the percent of faculty that are tenured (or tenure track) being associated with a 0.6 percentage point increase in the odds of reopening.

Table 4. Probit Models Using Alternative Measures of Financial Health (Marginal Effects).

	(1)	(2)	(3)
	Openb	**Openb**	**Openb**
Low_Risk	0.368 ***		
	(0.086)	0.381 ***	0.429 ***
Medium Risk	0.266 ***	(0.082)	(0.077)
	(0.097)	0.260 **	0.329 ***
	0.184 *	(0.097)	(0.101)
Zemsky	(0.094)		
		−0.037	
FA		(0.124)	
FC_D		0.267 **	
		(0.098)	
USNWR75up			0.322 ***
			(0.101)
USNWRT25			−0.065
			(0.147)
USNWRM			0.394 ***
			(0.058)
Popdensity	0.022	0.003	−0.001
	(0.031)	(0.031)	(0.031)
Studenthousing	0.003	0.004	0.008 *
	(0.004)	(0.004)	(0.004)
Tenuredfac	0.002	0.004	0.006 *
	(0.003)	(0.004)	(0.004)
Trump	0.031	0.014	−0.046
	(0.104)	(0.111)	(0.122)
Observations	123	123	123
Pseudo R^2	0.156	0.149	0.193

Robust standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5 presents multinomial probit effects. Here, we use the Zemsky measure of financial stress and estimate a model where schools have three choices: fully or primarily open, flex, or fully or primarily closed. This model allows us to see if the choices between being open and closed might have been impacted by flex choices that varied by school financial strength. Interestingly, being in a low or medium COVID-19 risk environment mainly has the effect of discouraging schools from choosing the fully or primarily closed option. It does not have any significant effect on being fully or primarily open or opting for some flexible plan. The coefficient on the Zemsky variable suggests that schools that are financially vulnerable are much less likely (17.7 percentage points) to choose the primarily closed option and 27.7 percentage points more likely to choose the primarily open option. The Zemsky index does not have a significant effect on choosing the flex option. Finally, no other coefficients have statistically significant derivatives in these models.

Table 5. Multinomial Probit Models Using the Zemsky Index (Marginal Effects).

	Primarily Open	Flex	Primarily Closed
Low_Risk	0.155	0.219	−0.374 ***
	(0.142)	(0.146)	(0.091)
Medium_Risk	0.143	0.116	−0.258 ***
	(0.105)	(0.108)	(0.102)
Zemsky Stress	0.274 ***	−0.097	−0.177 **
	(0.094)	(0.093)	(0.096)
Popdensity	−0.175	0.115	0.061
	(0.094)	(0.082)	(0.086)
Studenthousing	0.002	0.001	−0.003
	(0.004)	(0.004)	(0.004)
Tenuredfac	0.004	−0.002	−0.002
	(0.003)	(0.003)	(0.003)
Trump	−0.010	0.113	−0.014
	(0.093)	(0.105)	(0.107)
Observations	123	123	123

Standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$.

5. Discussion

Our estimates suggest that financially vulnerable liberal arts colleges were much more likely to choose a fully or primarily open operational mode in the fall of 2020 than their less financially stressed counterparts. This finding builds on the work of others such as Felson and Adamczyk (2021) and Castiello-Gutiérrez and Whatley (2021) to establish financial considerations as important within the context of the college reopening decision. While our findings contrast with those of Collier et al. (2021) in that they do not emphasize political considerations as important in the decision-making process, we believe that this is a result of our sample which is composed of private colleges that are relatively insulated from political pressure. This insulation, incidentally, allows us to better isolate the effect of financial stress as measured both by institutional wealth and by more targeted metrics (Zemsky et al. 2020). These metrics enable us to contribute important insights to the discussion; namely, that institutional decision making was not just influenced by overall wealth or foregone tuition but by financial stress more broadly.

Considering the preliminary indication that college reopenings had a real public health cost in terms of increased daily cases (Andersen et al. 2021), our results suggest a role for policy makers in mitigating the financial incentive to reopen. To get a rough idea of the way that financial incentives might have led to adverse health outcomes, we present data on conditional campus case counts in Table 6. This table uses data gathered by the New York Times on the number of COVID-19 cases experienced by college campuses.

Table 6. Campus COVID-19 Cases as % of Enrolled Students: For Schools in High-Risk Areas by Operational Choice and by Zemsky Index.

	Fully or Primarily In-Person		Fully or Primarily Online	
	Zemsky = 0	Zemsky = 1	Zemsky = 0	Zemsky = 1
	(1)	(2)	(3)	(4)
COVID-19 cases (as % of enrollment)	4%	7%	2%	1%
Number of Observations	8	7	19	5

Column (1) shows that amongst schools located in high-risk (orange or red) counties, those that chose to be fully or primarily open and that were not identified as being under stress based on the Zemsky criteria experienced COVID-19 cases on the magnitude of 4% of their enrollment. Schools that made the same choice but were under financial stress had cases measuring 7% of their enrollment. Those impacts can be contrasted with those

experienced by schools also in high-risk counties that chose to operate fully or primarily online. In that case, schools that were not facing a financial risk had cases measuring 2% of their enrollments while those under financial stress had a similar (1%) caseload. These data support two main observations: first, unsurprisingly, schools that chose to open under risky circumstances experienced caseloads that were higher than those opting for primarily or fully online operations. Second, schools that were under financial distress experienced the highest caseloads. Indeed, their caseloads were on the order of 5–6 percentage points higher than those experienced by schools that chose primarily or fully online operations. They also experienced higher rates than their less financially stressed counterparts. That difference could be attributed to differences in mitigation strategies arising from their differing resource bases, selection in the students attending the schools, or other differences in the surrounding epidemiological environment.

This brief overview of caseloads and financial stress, suggests a possible role for policy makers. While more work remains to be done before the dynamics underlying reopening decisions and the public health outcomes resulting from those decisions are fully understood, our preliminary analysis points towards the fact that financial stress might induce institutions to make a sub-optimal decision from a public health standpoint. If this is the case, future crisis relief could improve on policies such as the Paycheck Protection Program by predicating all or some of the disbursed funds on a safe reopening decision as opposed to a more financially viable one. Hopefully, this would both safeguard institutions of higher education that felt threatened by financial stresses and incentivize those institutions to make the decision that was safest for their students and their surrounding communities.

6. Conclusions

Colleges with ample resources were certainly impacted by the shock presented by COVID-19. They were, however, in the enviable position of having the resources that allowed them to reduce or eliminate in-person instruction, thereby forgoing housing or other sources of revenue in the service of public health. Alternatively, they could choose to offer primarily in-person instruction along with an effective (and costly) mitigation strategy using regular testing and quarantining as needed. Schools with fewer resources faced financial risks if they opted for a full or primarily online mode of operation. Indeed, we find that based on a variety of measures of financial health, schools facing financial stress were approximately 20 percentage points more likely to reopen and also had a higher rate of COVID-19 cases during the fall of 2020. While we have established a significant relationship between financial stress and the likelihood that an Annapolis Group college reopened, there is a notable limitation to our research; namely, that our sample is not representative of the population of postsecondary institutions in the United States. Although, as mentioned earlier, the inclusion criteria we employed allowed for several pronounced analytical benefits, we believe that readers should be cautious when attempting to apply our conclusions to larger, public universities. Future research should make use of binomial and multinomial choice models paralleling those presented in this paper, to evaluate the reopening decisions of institutional peer groups that materially differ from The Annapolis Group. In addition, we believe there is room to build on our findings by creating models that measure if, and to what extent, financial risk mediated the effect of a college's reopening decision on further quantitative measures of public health such as, hospitalizations and deaths in the surrounding community. This extension of our research would hopefully provide actionable insights relevant to the construction of crisis relief that will effectively incentivize schools to make the socially optimal choice. Ultimately, we believe that our research represents another step forward in the growing body of literature focused on better informing policy makers about how to respond to the Delta variant as well as future public health crises.

Author Contributions: Conceptualization, J.T., O.H., J.L. and D.Z.; methodology, D.Z.; software, O.H. and D.Z.; validation, J.T. and J.L.; formal analysis, J.T. and D.Z.; investigation, O.H.; resources, J.T.; data curation, J.L.; writing—original draft preparation, J.T., O.H., J.L. and D.Z.; writing—review

and editing, J.T., O.H., J.L. and D.Z.; visualization, J.T., O.H., J.L. and D.Z.; supervision, D.Z.; project administration, D.Z.; funding acquisition, D.Z. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: Restrictions apply to the availability of these data. Data were obtained from the C2i: College Crisis Initiative at Davidson College and are available upon request with the permission of Dr. Chris Marsicano and Daniel Brennan of Davidson College.

Acknowledgments: Jonah Tobin, Oliver Hall and Jacob Lazris are students at Williams College. David Zimmerman is Professor of Economics at Williams College. We are grateful to C2i at Davidson College for allowing us access to their data on college reopenings.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. Annapolis Group of Liberal Arts Colleges

	Open Status
Agnes Scott College	0
Albion College	2
Albright College	1
Allegheny College	2
Alma College	2
Amherst College	0
Augustana College	2
Austin College	2
Bard College	2
Bates College	2
Beloit College	1
Bennington College	1
Berea College	0
Birmingham-Southern College	2
Bowdoin College	0
Bryn Mawr College	2
Bucknell University	2
Carleton College	1
Carthage College	2
Centre College	2
Claremont McKenna College	0
Coe College	2
Colby College	2
Colgate University	1
College of the Atlantic	1
College of the Holy Cross	0
Colorado College	0
Connecticut College	1
Cornell College	1
Davidson College	1
DePauw University	2
Denison University	1
Dickinson College	0
Drew University	0
Earlham College	2
Eckerd College	2
Franklin & Marshall College	1
Furman University	1
Gettysburg College	0

Gordon College	1
Goucher College	0
Grinnell College	0
Guilford College	2
Gustavus Adolphus College	0
Hamilton College	1
Hampden-Sydney College	2
Harvey Mudd College	0
Haverford College	1
Hendrix College	0
Hiram College	1
Hobart and Williams Smith Colleges	1
Hollins University	2
Houghton College	1
Illinois Wesleyan University	0
Juniata College	1
Kalamazoo College	0
Kenyon College	1
Knox College	1
Lafayette College	0
Lake Forest College	0
Lawrence University	1
Lewis & Clark College	1
Luther College	1
Macalester College	0
Manhattan College	1
McDaniel College	0
Middlebury College	1
Millsaps College	2
Monmouth College	2
Moravian College	1
Mount Holyoke College	0
Muhlenberg College	0
Nebraska Wesleyan University	2
Oberlin College	0
Occidental College	0
Oglethorpe University	0
Ohio Wesleyan University	2
Pitzer College	0
Pomona College	0
Presbyterian College	2
Randolph College	0
Randolph-Macon College	0
Reed College	1
Rhodes College	0
Ripon College	1
Rollins College	1
Saint Mary's College	2
Saint Olaf College	2
Sarah Lawrence College	0
Scripps College	0
Sewanee: The University of the South	0
Skidmore College	1
Smith College	0
Southwestern University	2
Spelman College	0
St. John's College	0
St. Lawrence University	1

St. Norbert College	2
Susquehanna University	2
Swarthmore College	0
The College of Wooster	0
Transylvania University	0
Trinity College	0
Trinity University	1
Union College	2
University of Puget Sound	0
Ursinus College	2
Vassar College	1
Wabash College	2
Washington & Jefferson College	0
Washington College	0
Washington and Lee University	2
Wellesley College	0
Wesleyan University	1
Westmont College	1
Wheaton College	1
Whitman College	0
Whittier College	0
Willamette University	1
William Jewell College	2
Williams College	2
Wittenberg University	1
Wofford College	2

Fully or Primarily In-Person = 2
Flex = 1
Fully or Primarily Online = 0

Appendix B. Description of Variables

Variable Name	Description
openb	Fully or Primarily In-Person = 1
openm	Fully or Primarily In-Person = 2 Flex = 1 Fully or Primarily Online = 0
Low_Risk	Average daily new COVID-19 cases per 100,000 <1 (Green)
Medium_Risk	Average daily new COVID-19 cases per 100,000 1–9 (Yellow)
High_Risk	Average daily new COVID-19 cases per 100,000 10+ (Orange or Red)
FA	Forbes Financial Score A− to A+
FB	Forbes Financial Score B− to B+
FC_D	Forbes Financial Score D to C+
ETQ	Endowment per student in top quartile
EBQ	Endowment per student in bottom quartile
EM50	Endowment per student in middle 50 percent
USNWRT25	USNWR ranking top 25
USNWR75up	USNWR 75+
USNWR2674	USNWR ranking 26–74
USNWRM	USNWR rank missing
Zemsky	Zemsky Stress Index > 0
Trump	Percent voting Trump in county in 2020 50%+
Popdensity	Population density per square mile
Studenthousing	Percent of students in student housing
Endowperstudent	Endowment per student in $1000
Tenuredfac	Percent faculty tenured or on tenure track

Notes

[1] While there was a federal response through the Paycheck Protection Program, it did not have different financial incentives for institutions based on their operational choice.

[2] The proportion of tenure-track faculty might be considered another indicator of the financial stability of the college. Indeed, 67% of faculty are tenured or tenure-track in the top quartile of schools in terms of their endowment per student, while only 47% are tenure or tenure-track in the bottom quartile of schools. Estimates excluding this variable show a negligible change on the COVID-19 risk and financial risk coefficients.

[3] Estimates using a continuous measure of the percentage of voters in a county voting for Trump are also statistically insignificant.

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