1 Introduction

The disruptive effects of the COVID-19 outbreak have impacted almost all sectors of our society. Higher education is no exception. Anecdotal evidence paints a bleak picture for both students and universities. According to the American Council on Education, enrollment is likely to drop by 15% in the fall of 2020, while at the same time many institutions may have to confront demands for large tuition cuts if classes remain virtual.[1] In a similar vein, students face an increasingly uncertain environment, where financial and health shocks (for example, lack of resources to complete their studies or fear of becoming seriously sick), along with the transition to online learning may have affected their academic performance, educational plans, current labor market participation, and expectations about future employment.

This paper attempts to shed light on the impact of the COVID-19 pandemic on college students. First, we describe and quantify the causal effects of the COVID-19 outbreak on a wide set of students' outcomes/expectations. In particular, we analyze enrollment and graduation decisions, academic performance, major choice, study and social habits, remote learning experiences, current labor market participation, and expectations about future employment. Second, we study how these effects differ along existing socioeconomic divides, and whether the pandemic has exacerbated existing inequalities. Finally, we present suggestive evidence on the mechanisms behind the heterogeneous COVID-19 effects by quantifying the role of individual-level financial and health shocks on academic decisions and labor market expectations.

For this purpose, we surveyed about 1,500 undergraduate students at Arizona State University (ASU), one of the largest public universities in the United States, in late April 2020. The fact that ASU is a large and highly diverse institution makes our findings relevant for most public institutions in the country. The survey was explicitly designed to not only collect student outcomes and expectations after the onset of the pandemic, but also to recover counterfactual outcomes in the absence of the outbreak. Specifically, the survey asked students about their current experiences/expectations and what those experiences/expectations would have been had it not been for the pandemic. Because we collect information conditional on both states of the world (with the COVID-19 pandemic, and without) *from each student*, we can directly analyze how each student believes COVID-19 has impacted their current and future outcomes.[2] For example, by asking students about their current GPA in a post-COVID-19 world and their expected GPA in the absence of COVID-19, we can back out the subjective treatment effect of COVID-19 on academic performance. The credibility of our approach depends on: (1) students having well-formed beliefs about outcomes in the counterfactual scenario. This is a plausible assumption in our context since the counterfactual state is a

[1] See, the New York Times article *"After Coronavirus, Colleges Worry: Will Students Come Back?"* (April 15, 2020) for a discussion surrounding students' demands for tuition cuts.

[2] In some cases, instead of asking students for the outcomes in both states of the world, we directly ask for the difference. For example, the survey asked how the pandemic had affected the student's graduation date.

realistic and relevant one - it was the status quo less than two months before the survey, and (2) there being no systematic bias in the reporting of the data - an assumption that is implicitly made when using any survey data.[3]

Our findings on academic outcomes indicate that COVID-19 has led to a large number of students delaying graduation (13%), withdrawing from classes (11%), and intending to change majors (12%). Moreover, approximately 50% of our sample separately reported a decrease in study hours and in their academic performance. The data also show that while all subgroups of the population have experienced negative effects due to the outbreak, the size of the effects is heterogeneous. For example, compared to their higher-income counterparts, lower-income students (those with below-median parental income) are substantially more likely to delay graduation. Finally, we find that students report a decrease in their likelihood of taking online classes as a result of their recent experiences. These effects are, however, more than 150% larger for honors students, suggesting that, a priori, most engaged students strongly prefer in-person classes.

As expected, the COVID-19 outbreak also had large negative effects on students' current labor market participation and expectations about post-college labor outcomes. Working students suffered a 31% decrease in their wages and a 37% drop in weekly hours worked, on average. Moreover, around 40% of students lost a job, internship, or a job offer, and 61% reported to have a family member that experienced a reduction in income. The pandemic also had a substantial impact on students' expectations about their labor market prospects post-college. For example, their perceived probability of finding a job decreased by almost 20%, and their expected earnings when 35 years old (around 15 years from the outbreak) declined by approximately 2.5%. This last finding suggests that students expect the pandemic to have a long-lasting impact on their labor market prospects.

We find that the substantial variation in the impact of COVID-19 on students tracked with existing socioeconomic divides. For example, compared to their more affluent peers, lower-income students are 55% more likely to delay graduation due to COVID-19 and are 41% more likely to report that COVID-19 impacted their major choice. Further, COVID-19 nearly doubled the gap between higher- and lower-income students' expected GPA.[4] There also is substantial variation in the pandemic's effect on preference for online learning, with Honors students and males revising their preferences down by more than 2.5 times as much as their peers. However, despite appearing to be more disrupted by the switch to online learning, the impact of COVID-19 on Honors students' academic outcomes is consistently smaller than the impact on non-Honors students.

[3]This approach has been used successfully in several other settings, such as to construct career and family returns to college majors (Arcidiacono et al., 2020; Wiswall and Zafar, 2018), and the causal impact of health on retirement (Shapiro and Giustinelli, 2019)

[4]The income gap in GPA increased from 0.052 to 0.098 on a 4 point scale. It is significant at the 1% level in both scenarios.