



# South African student retention during 2020: Evidence from system wide higher education institutional data?

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# South African student retention during 2020: Evidence from system wide higher education institutional data

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## Abstract

Using longitudinal, institutional data we document the impact of COVID-19 on undergraduate student retention at public universities in South Africa. We find that student dropout increased in 2020 for students in 3-5th year, with little evidence of a change for those entering their second year of study. These aggregate findings mask significant differences across institutions. Students enrolled in most historically advantaged traditional institutions, and some comprehensive institutions, were not significantly affected, whereas dropout increased significantly at the University of Fort Hare, Walter Sisulu University and the University of Venda, three historically disadvantaged institutions located in rural areas. No difference in retention is found, however, for students enrolled at the University of Zululand (UZ) or the University of Limpopo (UL), equally resource-disadvantaged institutions where a majority (over 90%) of students are funded via the National Student Financial Aid Scheme (NSFAS). Furthermore, at institutions where dropout increased, NSFAS-funded students were less impacted than their unfunded peers.

Our overall findings accord with growing evidence that COVID-19-related changes in the sector differentially impacted students from lower socioeconomic backgrounds. However, they also illustrate that the NSFAS bursary appears to have provided a social safety net during this time. Finally, the example of UZ and the UL provide suggestive evidence that institutional relational aspects are important too. Together, these results foreground the complex interplay of factors impacting a student's decision to drop out of or remain in university, highlighting that institutional responses and/or relational context during a crisis like COVID-19 can positively impact student retention.

Keywords: Student retention, dropout, educational inequalities, higher education, South Africa, institutional data, COVID-19

Classification codes: I24, I22, I23

# 1 Introduction

Given the high levels of inequality in the country and in the higher education sector alike, understanding the impact of COVID-19 in South Africa on existing inequalities in the higher education system is important. South Africa typifies a high inequality setting with deep class, race, and income stratification, particularly in access and completion of tertiary education. A labour market characterised by high unemployment rates and high returns to tertiary qualifications in South Africa (Keswell & Poswell, 2004; Salisbury, 2016) mean that growth in educational inequality has consequences for reproducing economic inequality.

Universities across South Africa closed in 2020 in order to mitigate the spread of COVID-19. The closure of the somewhat equalising environments of campuses and residences forced students to return to home environments characterised by deeply embedded socioeconomic inequalities, where access to data and learning devices to support remote learning is limited (Department of Higher Education and Training, 2020; Whitelaw et al., 2020).

Although all institutions were instructed to close their campuses, there was no national level road-map of how to deal with the challenges these closures presented. As a result, institutions dealt with them based on their institutional, staff, and student capacities and capabilities. Thus in addition to student-specific factors, institutional differences are likely to have affected how students across the system coped with their studies in 2020, potentially impacting existing inequalities in higher education.

Given the large share of students (69% of contact undergraduate students) funded via the National Student Financial Aid Scheme (NSFAS), the adjustments made by the scheme during the lockdown would have had far reaching implications for students. NSFAS continued to pay institutions directly for tuition and campus accommodation, but increased living allowances to the monthly rate provided to off-campus students. No additional allowances were provided to cover costs incurred as a result of vacating residences or staying at home.

In this paper, we use annual information on students enrolled and staff employed

at contact public universities in South Africa, captured in the Higher Education Management Information System (HEMIS) and engage in a system-wide assessment of the following research question:

What was the impact of 2020 on student retention, and how did it vary across institutions and based on student financial aid status?

There are a number of reasons that documenting the effects of the lockdown on students' persistence is important. Under the state's new NSFAS policy, students from families with incomes below R350 000 are eligible for a bursary to cover the full cost of studying, including tuition, housing and a living allowance. This presents an interesting context under which to assess student responses to COVID-19. Tuition and residence-fee bursaries remove the direct cost of attendance for those funded. At the same time, students receiving NSFAS funding are, by the design of the policy, from lower socioeconomic households. In 2020, campuses and institutional residences closed for all students, regardless of their funding status. Thus vulnerability to socioeconomic hardship as well as limited access to data and devices for learning, would have been highest among the NSFAS-funded group. Moreover, students who dropped out, or stopped out, in 2020 are vulnerable to losing this financial aid.

Our study contributes to existing quantitative analyses on the effects of the pandemic on higher educational inequalities in a developing country context. Our work complements that of Chisadza et al. (2021) and Whitelaw et al. (2023), who assess student performance at specific institutions in South Africa and Prudencio et al. (2023) who examine performance and enrolment in Mexico. Our specific contribution is in the focus on all public universities. By considering the effect of the pandemic across the system we provide evidence of how existing inequalities in higher education may have been impacted.

The remainder of the paper is organised as follows. In the following section, we review existing literature on the impact of the COVID-19 pandemic on student retention. Next, in Section 3, we provide institutional context and outline the adjustments made to NSFAS during 2020. Thereafter, we discuss our data, measures and statistical methods in Sections 4, 5, and 6 respectively, before presenting and discussing results in Sections 7

and 8. Finally, we conclude in Section 9.

## 2 Impact of COVID-19 closures literature

The global education landscape underwent unprecedented disruptions due to the onset of the COVID-19 pandemic in 2020, prompting investigations into its implications for university retention and performance. Existing research on the impact on university retention is, however, quite limited and has focused primarily on the United States and Germany context, with a study from Mexico an exception (Prudencio et al., 2023). There remains a discernible gap in understanding how the pandemic influenced retention patterns within developing countries, particularly in the African context.

A recurring theme throughout the studies found, is the significance of context in explaining retention and the heterogeneous nature of the pandemic's impact on student retention. Vulnerable groups exhibit heightened susceptibilities to dropping out with individuals dealing with disabilities, familial obligations, and socio-economic challenges more likely to discontinue their studies (Koopmann et al., 2023; Liu, 2021; Prudencio et al., 2023; Rodríguez-Planas, 2022). This foregrounds the potential of the pandemic to magnify existing disparities within higher education.

Rodríguez-Planas (2022) note, however, that despite grappling with exacerbated financial hardships, recipients of the Pell grant, a financial aid bursary available to low income student in the US, do not demonstrate an increased propensity to dropout of university. Rather, the only difference found for this group compared to their unfunded peers was a tendency to reduce academic load, possibly a way to uphold academic performance. This suggests that funded students may have adopted a more cautious academic trajectory in an attempt to ensure eligibility for financial aid in otherwise difficult circumstances.

Familial circumstances and support networks are also shown to have been important in determining retention outcomes during COVID-19. Mishra and Müller (2022) underscore the instrumental role of social capital for migrant students in Germany. While retention

correlated with improved socio-economic circumstances during COVID-19, the study highlights how aspirational norms and protective dynamics within student networks act as barriers against attrition. This accentuates the significance of a broader social fabric in shaping students' decisions regarding retention.

Furthermore, institutional characteristics may have played a part too. Prudencio et al. (2023) highlight the differential repercussions of the pandemic across varied institutional contexts in Mexico, revealing disparities across delivery format, funding sources, and institutional prestige. Chambers et al. (2023) emphasize the importance of support provided by professors and institutional crisis management messaging, showcasing their pronounced influence on students' tendencies towards attrition. Finally, Ogunmokun et al. (2022), similarly, underscore the efficacy of crisis response strategies, with resilient coping mechanisms and trust serving as pivotal mediators between such responses and students' attrition inclinations.

By utilising institutional data from all public higher education institutions in South Africa, this study is the first that we know of to comprehensive document the impact of the pandemic on student retention within an African country context. Our analysis examines actual retention rates during 2020, controlling for changes in cohort and individual characteristics, juxtaposed against antecedent years for students across all public (contact) universities in South Africa. We therefore contribute to the literature on the impact of COVID-19 from system-wide higher education data i.e. to the studies of Liu (2021) (for the US) and Prudencio et al. (2023) (for Mexico). Furthermore, given the heterogeneity of South African institutions in terms of student, resource and historical context, this study provides a nuanced mapping of the interplay between institutional attributes, resource allocations, and retention outcomes. Finally, retention differentials between financial aid students and their unfunded peers provides insightful understanding of the interplay between financial support mechanisms and students' persistence trajectories.

### 3 Public higher education in South Africa

The public higher education system in South Africa is intentionally diverse and differentiated in order to address a wide range of emerging skills and knowledge needs (Council on Higher Education (South Africa), 2013). The range of activities across undergraduate and postgraduate levels determines whether an institution is classified as teaching-led (University of Technology), comprehensive (Comprehensive University), or research-led (Traditional University) (Department of Higher Education and Training, 2022a). Before COVID-19-related closures, the predominant teaching modality at all institutions in South Africa, except for UNISA, was face-to-face (contact learning).

Institutions are also defined by their historical (dis)advantage which reflects apartheid legislation on the classification of institutions. Institutions designated to serve white South Africans received preferential treatment during apartheid, including in the share of state funding allocations. These are referred to as historically advantaged (HA) institutions. Institutions designated to serve Black and Coloured students, referred to in the text as historically disadvantaged institutions (HD), were under-resourced and intentionally situated in peripheral and rural areas. The mergers of the 2000s was an attempt by the post-apartheid government to reconfigure a fragmented and unequal system (Department of Higher Education and Training, 2013). Infrastructure and student body affluence continues, however, to be delineated across these historic lines.

Institutions differ in the composition of their staff bodies, their geographical location and the infrastructure and resources available in them. Together, these differences affected institutions' abilities to facilitate remote teaching and learning in 2020. While some institutions were ready to resume the academic year remotely less than a month after closures, others experienced delays as measures needed to be put in place to support remote delivery of learning content (e.g., zero-rating e-learning platforms).

Public higher education institutions are funded via a combination of state funds, tuition fees (paid by students or their funder) and third stream payments. Therefore while institutions have a fair degree of autonomy in how they function, they are strongly shaped by the structure of the funding framework, which includes an enrolment plan,

input and output incentives, NSFAS policies<sup>1</sup> and the availability and conditions of third stream funds. The relative weighting of these different factors is linked to institutional type and, continue to be aligned with historical (dis)advantage.

The share of students funded by NSFAS has grown substantially over the past two decades (Department of Higher Education and Training, 2022b). For students entering from 2018, NSFAS funding is in the form of a full cost of study bursary that includes institution-specific tuition and accommodation and nationally-standardised provision of funds to cover transport, books, food and off-campus accommodation. Any first-time entering student from a combined family income up to R350 000 per annum is eligible for funding. Eligibility for students who registered at institutions prior to 2018, continues to be based on the R122 000 per annum household income threshold, and the amount of funding is capped. The previous loan-bursary scheme has, however, been replaced with a full bursary for these cohorts. Therefore NSFAS provides a comprehensive bursary package to a large majority of students enrolled in the South African higher education system.

With 69% of students funded via NSFAS in 2020, the funding adjustments made by NSFAS in response to the pandemic, are in some sense, the largest centralised response for the sector, with potentially far reaching implications for responses taken by institutions during the COVID-19-related closures. We therefore outline these adjustments.

NSFAS covers institution program specific tuition costs, which are paid directly to institutions. In addition to these fees, accommodation, living allowances and travel are paid based on the living arrangement of the student. Students are grouped as those 1) in catered residences, 2) in non-catered residences, 3) in private formal lease agreement accommodation and 4) living at home. For groups 1 and 2, accommodation fees are paid directly to the institutions, while group 3 receives the funds directly and is responsible for the payment. Group 4 does not receive an accommodation allowance. In addition to accommodation allowances, all students receive a living allowance. In 2020, the initial annual living allowance was R15 000 (R1 500 per month for 10 months) for group 2, 3, and

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<sup>1</sup>Given the large share of tuition fee income originating from NSFAS

4; and R2 900 per annum for group 1, reflecting that food costs are absorbed by catered residences (NSFAS, 2020). With the implementation of the lockdown, living allowances were equalised across groups, such that all students received a living allowance of R1 500 per month for the period of the lockdown.

These NSFAS structures and responses have implications for the experience of students funded by NSFAS during the COVID-19 lockdown. All residence students were asked to vacate residences during the lockdown. While a handful of students did remain in residences, most were required to ‘return home’. No additional allowances were provided to cover costs incurred as a result of vacating residences and staying at home. In practice, therefore, groups 1 and 2 were funded in the same way as NSFAS students residing at home. Students in private accommodation and those initially residing at home could therefore be argued to have been less impacted in 2020 than NSFAS students in residences, first because their living environments did not change and, for the former group, secondly because their accommodation continued to be covered by NSFAS. Institutions differ in the number of residence beds they have available for students and therefore composition of students in in residence versus private versus home accommodation. This may have had implications for the impact of COVID-related closures on students’ decision to remain enrolled.

## 4 Data

We use annual, individual-level institutional data on students entering their first undergraduate qualification (called FTEN<sup>2</sup> students) in South African public contact institutions between 2015 and 2019 from the Higher Education Management Information System (HEMIS). We restrict the sample to students in full-time contact diploma, bachelor or professional degree programs<sup>3</sup>. We draw on data from HEMIS, as it provides a system-wide picture, and analyse student retention at Traditional Universities (TUs), Comprehensive Universities (CUs) and University of Technologies (UoTs).

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<sup>2</sup>First time entering new students.

<sup>3</sup>This restriction removes most UNISA students and we therefore exclude UNISA from the analysis.

Table 1 presents average undergraduate (UG) student characteristics by institution, grouped by institution type (TU, CU, UoT). Within institution type (e.g. TU, CU or UoT) we sort institutions by share of NSFAS-funded students. Table 1 shows that female students hold a larger share of the enrolment positions than male students in most institutions, with the exception of VUT and TSUT and the share of African, Coloured, and Indian students is strongly correlated with the share of students funded by NSFAS. Our analysis population is over 95% African in 4 of the 7 CUs, 4 of the 6 UoTs and 3 of the 12 TUs.

Table 1: Student characteristics: 2015-2019 FTEN UG

Name	Age	Female	African	Coloured	Indian	White	NSFAS funded	Postcode quintile	Bachelors	Min Time	Students obs	Student year obs
TUs:												
US	20.5	.56	.12	.2	.03	.64	.2	4.85	1	3.6	25719	81731
UP	20.7	.55	.45	.03	.06	.45	.32	3.83	1	3.5	41801	134360
UCT	20.4	.54	.32	.16	.07	.23	.33	4.11	.99	3.6	19900	66112
RU	20.6	.61	.71	.05	.06	.18	.44	3.34	1	3.2	6918	21706
WITS	20.4	.55	.67	.04	.13	.15	.45	3.48	1	3.5	28440	92822
NWU	21.1	.57	.59	.04	.01	.37	.52	2.99	.98	3.3	45781	144067
UWC	21.1	.61	.45	.47	.03	.04	.56	3.57	1	3.4	21925	70860
UFS	21.6	.6	.77	.05	.01	.16	.64	2.75	1	3.4	32324	107825
UKZN	20.7	.57	.8	.02	.16	.02	.73	2.83	1	3.5	40988	136660
SMHSU	21.3	.63	.95	0	.02	.03	.77	2.46	1	4.3	5003	17672
UFH	22.8	.55	.97	.02	0	.01	.85	2.11	1	3.5	14565	48307
UL	21.1	.53	1	0	0	0	.94	2.05	1	3.5	23591	76904
CUs:												
NMU	21.3	.53	.69	.13	.01	.17	.61	2.95	.59	3.2	24762	83719
UJ	21.1	.51	.88	.03	.04	.05	.62	3.1	.69	3.1	51003	160886
SPU	21.9	.57	.71	.25	.01	.04	.75	3.11	.82	3.5	2219	6762
WSU	22.8	.55	.99	0	0	0	.86	1.68	.46	3.2	32306	109653
UV	22.3	.53	1	0	0	0	.87	1.73	.97	3.4	16730	57136
UM	21.7	.58	1	0	0	0	.87	2.34	.54	3.3	4147	11728
UZ	22.2	.58	1	0	0	0	.93	2.17	.91	3.4	18274	60334
UoTs:												
CPUT	21.9	.55	.66	.26	.01	.08	.64	3.23	.25	3.2	30489	100593
DUT	21.6	.5	.88	.01	.1	.01	.68	2.74	.18	3.0	35435	109628
CUT	22.7	.51	.94	.02	0	.04	.71	2.69	.37	3.1	18462	61334
VUT	22.1	.45	.99	0	0	.01	.76	2.53	.06	2.9	21649	69620
TSUT	22	.51	.97	0	0	.02	.8	2.51	.11	3.0	57723	193689
MUT	22.2	.48	1	0	0	0	.87	2.4	.01	3.0	16746	53627

Note: Min time abbreviates minimum time to completion of qualification.

The composition of qualifications, and hence average minimum time to completion, differs by institution type. Almost all students enrolled in TUs in our analysis population are in bachelor degrees or professional bachelor degrees. In comparison, the share in bachelor degrees in CUs ranges from 46% in WSU to 97% in UV. Students in UoTs are mostly enrolled in diploma qualifications, with the share in bachelor programs ranging from 1% in MUT to 37% in CUT.

The national institutional data contains minimal information on student background circumstances. One potentially useful variable is whether the student is state funded. State funding is administered through the National Student Financial Aid Scheme (NSFAS). We draw on a supplementary measure of student SES to provide additional information about the student’s home environment. Students’ home postal codes are mapped to information from the Census 2011 (see Culligan (2022) for details). We therefore have measures of the average characteristics of the postal code from which a student originates<sup>4</sup>. Utilising average postal income, we construct quintiles of the income distribution for students in each year<sup>5</sup>. Table 1 illustrates that the average postal code quintile within an institution correlates relatively well with the share of students on NFSAS funding, suggesting that, at least on average, our postal codes provide a useful measure of SES ranking.

Appendix Table 7 summarises the characteristics of FTEN students in 2020 within the postal code income quintiles as previously defined. The first panel of variables represent characteristics from the HEMIS student level data. Students in quintiles 1 and 2 are marginally older than quintile 4 and 5 students, on average, over 96% are Black and over 70% are NSFAS funded. The second panel presents information from the Census 2011. Students in quintiles 1 and 2 come from postal codes with high levels of deprivation. The average education level of adults in 2011 in quintile 1 postal codes is 5.5 years, only 2% of individuals in these postal codes have a diploma or higher qualification, 25% of adults are working, with 25% unemployed or discouraged. In terms of access to resources required for remote learning, in 2011 average electricity connectivity in households in these areas was 54%, 5% of households had a computer and 1.4% had an internet connection. That being said, 83% of households had a cell phone, similar to the share of households in other income quintiles.

Our outcome measure of interest is student dropout, defined by students who exit without completing their qualification, or who drop out during the year of interest.

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<sup>4</sup>Average postal codes provides a noisy measure of student home characteristics. Students tend to come from, on average, more affluent households within a postal code. Furthermore, students within the same postal code will select into different institutions based on their home characteristics.

<sup>5</sup>We use the full population of students with postal codes to construct these quintiles.

Students may, however, return in subsequent years or may have enrolled at a different institution.<sup>6</sup> The HEMIS data captures enrolment at a mid-year point, therefore students who initially enrol and subsequently dropout before the HEMIS census date are classified as dropouts. Our measure of dropout in 2020 therefore includes both those students who did not enrol at the start of the year (before the start of the pandemic) and those who dropped out by the HEMIS census date.<sup>7</sup>

Table 2 presents dropout rates by year of study for each institution in our analysis, with institutions grouped by institutional type. Dropout rates are highest in year 2 and 5, averaging 11% and 14%, with average rates across institutions of 7% and 8% in years 3 and 4. Dropout rates vary by institution, but with no particular pattern related to institutional or historic type. VUT has the highest overall dropout rates and SMHSU the lowest.

Table 2: Dropout rates by institution and year of study: FTEN UG

Name	Dropout Y2-5	Year 2	Year 3	Year 4	Year 5
US	.078	.101	.053	.061	.092
UP	.095	.123	.068	.067	.097
UCT	.063	.072	.05	.06	.088
RU	.087	.084	.071	.105	.174
WITS	.097	.121	.076	.071	.103
UFS	.116	.131	.098	.1	.143
NWU	.09	.097	.068	.084	.176
UWC	.108	.128	.098	.076	.103
UKZN	.069	.07	.055	.072	.128
SMHSU	.045	.056	.037	.036	.038
UFH	.081	.096	.059	.059	.162
UL	.067	.075	.053	.055	.139
NMMU	.097	.116	.076	.073	.132
UJ	.11	.135	.078	.09	.149
SPU	.109	.11	.115	.07	.227
WSU	.092	.104	.064	.074	.182
UV	.046	.062	.027	.032	.068
UM	.086	.102	.056	.061	.316
UZ	.058	.069	.029	.059	.145
CPUT	.126	.169	.094	.081	.119
DUT	.108	.137	.063	.086	.175
CUT	.118	.135	.094	.103	.14
VUT	.13	.125	.089	.155	.266
TSUT	.1	.134	.065	.067	.126
MUT	.079	.074	.055	.094	.196

<sup>6</sup>Removing those who enrolled at other institutions from those defined as dropouts had little impact on the substantive findings.

<sup>7</sup>To the extent that conditions in 2020 induced increases in dropout in the second half of 2020, our estimate on the impact of 2020 on retention will be an underestimate. We do not have access to 2021 HEMIS data and can therefore not examine this directly

## 5 Student retention - a theoretical framework

The decision to drop out could represent a plausible response to the hardships faced in 2020. At the same time, funding and employment prospects in South Africa add an additional complexity to this decision. We augment the theoretical framework described in Aina et al. (2022) to guide this discussion and the analysis of our results.

Paraphrasing Aina et al. (2022), student  $i$  enrolls at university in time period  $t$  ( $t = 0, 1, 2, \dots, x$ ), iff

$$U(NPV_t^i, B_{NMt}^i) > C_{NM}(e_t^i) \quad (1)$$

where  $NPV$  is the expected net present value of obtaining a university degree,  $B_{NMt}$  is the expected non-monetary benefit of studying, and  $C_{NM}$ , is the expected non-monetary costs of studying and is a function of effort,  $e$ . Expected monetary benefits, together with expected direct and indirect monetary costs, determine the NPV of the university degree.

Explicitly accounting for student funding in Aina et al. (2022)'s specification, we have:

$$NPV_t^i = \left( \sum_{j=x+1}^L \frac{Y_{Dt}^j}{(1+r)^j} - \sum_{j=1}^L \frac{Y_{Nt}^j}{(1+r)^j} \right) - \left( \sum_{j=1}^x \frac{C_{Mt}^j}{(1+r)^j} - \sum_{j=1}^x \frac{F_{Mt}^j}{(1+r)^j} \right) \quad (2)$$

$Y_D$  is the yearly earnings of a university graduate and  $Y_N$  is the yearly potential earnings of a high-school graduate (which is also the foregone earnings for the period when the student is enrolled at university). Therefore the difference is the relative benefit (return) to completing a qualification.  $C_M$  is the direct monetary cost involved in getting the degree, reduced by  $F_M$ , funding received.  $L$  is the retirement age, and  $r$  is the discount rate. All components are expected values, and monetary benefits and costs can change over time while the student is enrolled,  $t = 1 \dots x$ , at university.

It is interesting to consider the South African context within this framework, especially for a student funded by NSFAS. First, the framework assumes that foregone earnings,  $Y_N$ , are positive. However, in South Africa, youth unemployment rates are high for

youth without completed qualifications, especially those in rural areas, and the wage return to completing a qualification is typically large. Thus  $Y_D$ , the yearly earnings of a university graduate, is high relative to  $Y_N$ , which may be low or zero for many students. Furthermore,  $C_M$ , the monetary cost of obtaining the degree is (designed to be) zero for students on NSFAS bursaries and  $F_M$  includes an allowance for housing and food. Thus  $NPV$  will be positive and large for funded students. Aina et al. (2022) state that:

if expected monetary benefits and costs do not change, a student either:

- remains enrolled at university if her expectations about the contents of the study program ( $B_{NM}$ ) are satisfied and the effort needed to keep up the study program ( $C_{NM}$ ) is affordable, i.e.,  $B_{NM} > C_{NM}$ ;
- drops out if her non-monetary benefits ( $B_{NM}$ ) are lower than expected and/or the effort required ( $C_{NM}$ ) is higher, i.e.,  $B_{NM} < C_{NM}$ .

This framework is useful for considering student retention behaviour during COVID-19. Considering non-monetary costs and benefits,  $C_{NM}$  would have changed with the introduction of online learning, possibly declining for those with access to laptops, internet and home environments conducive to learning, while increasing for those without these resources. Furthermore,  $B_{NM}$  may have declined for students removed from residences and returning to homes with extra domestic demands and without the necessary study comforts. Shifts in the availability of time to study (either up or down) would also have impacted  $C_{NM}$ . Thus, based on non-monetary costs and benefits, we might expect an increase in dropout in institutions with a large share of students from lower SES backgrounds.

Expected monetary benefits and/or costs may also have shifted in 2020. Students potentially incurred additional costs for data, laptops and accommodation. Furthermore, expected earnings and family financial conditions also may have changed during COVID-19 affecting  $NPV$  to the extent that dropping out was an optimal decision.

However, as discussed in Section 3, students funded via NSFAS continued to receive living allowances during the pandemic, and those in private accommodation continued to

have their housing costs covered. *NPV* is, therefore, likely to have remained positive for students on NSFAS, especially those in private accommodation. The NSFAS payments may have provided a stable income in a time of severe hardship, encouraging students to remain enrolled.

Table 3 presents student attrition rates for our analysis population by year of study<sup>8</sup> and institution type for cohorts 2015-2019. Means are calculated separately for TU, CU and UoT students. Outcomes in 2020 are highlighted in grey. The table shows that in TUs and CUs, dropout rates increased in 2020 for all year except year 2, with the increase larger in later years. Rates of dropout among second years in 2020 are similar to previous cohorts at all institution types, as are dropout rates for third years in UoTs. The trends suggests that students in different years of study may have implemented different strategies to cope with the uncertainty associated with the pandemic.

Table 3: Dropout rates by cohort and year of study: FTEN UG

	Year	2015		2016		2017		2018		2019	
		mean	n	mean	n	mean	n	mean	n	mean	n
Year in 2020		6		5		4		3		2	
Dropout: TUs	2	.103	56617	.101	60970	.092	61724	.093	64574	.094	63207
	3	.059	50672	.06	54752	.063	56205	.071	58934		
	4	.06	36421	.066	39430	.08	41539				
	5	.105	17742	.129	19987						
Dropout: CUs	2	.115	29366	.108	31200	.097	28090	.1	29718	.103	31162
	3	.056	26115	.056	27864	.055	25851	.073	27194		
	4	.067	19375	.06	20656	.09	18794				
	5	.119	10017	.174	10268						
Dropout: UoTs	2	.159	32602	.141	35914	.12	37826	.112	37057	.109	36558
	3	.077	27781	.07	31413	.067	33523	.067	34253		
	4	.09	20851	.083	24227	.107	24429				
	5	.139	11810	.197	13131						

## 6 Empirical strategy

To plausibly measure the impact of the pandemic on dropout, we employ a within-year-of-study difference model and compare dropout rates for students during the pandemic against dropout prior to the pandemic in the same academic year of study.

<sup>8</sup>Defined as year since start.

We estimate the following Linear Probability Model (LPM):

$$\begin{aligned}
Y_{ijt} = & \beta_0 + \beta_1 C_{2019} + \beta_2 T2 + \beta_3 (C_{2019} \cdot T2) \\
& + \beta_4 C_{2018} + \beta_5 T3 + \beta_6 (C_{2018} \cdot T3) \\
& + \beta_7 C_{2017} + \beta_8 T4 + \beta_9 (C_{2017} \cdot T4) \\
& + \beta_{10} C_{2016} + \beta_{11} T5 + \beta_{12} (C_{2016} \cdot T5) \\
& + X_{it} \boldsymbol{\delta} + \epsilon_{ijt},
\end{aligned} \tag{3}$$

where  $Y_{ijt}$  indicates that student  $i$  does not re-enrol in institution  $j$  in calendar year  $t$ ,  $TK$  is an indicator for year of study  $K = 2, \dots, 5$ , defined as year since started university, and  $C_y$  indicates the student's cohort i.e. the calendar year  $y = 2016, \dots, 2019$  in which student  $i$  started studying (with the 2015 cohort as the omitted category).  $\mathbf{X}$  is a vector of individual characteristics and  $\epsilon_{it}$  is an idiosyncratic error. The coefficient estimates of interest are  $\beta_3, \beta_6, \beta_9$  and  $\beta_{12}$ , and represent the differential impact on dropout for students attending years 2, 3, 4 and 5 during 2020. For example, the cohort who started studying in 2019,  $C_{2019}$ , would have been in year of study 2,  $T2$ , in 2020, and therefore impacted by COVID-19 ( $C_{2019} \cdot T2 = 1$ ). Their dropout rates are compared to students who entered year 2 prior to 2020, and therefore not affected ( $C_{2019} \cdot T2 = 0$ ).  $\mathbf{X}$  includes indicators for female, race group, Classification of Education Subject Matter (CESM), qualification type (degree versus diploma), NSFAS funding status, and age.

We estimate equation 3 by institution type (TU, CU and UoT) and individually for each institution  $j$ . Regressions by institution type include institution dummies.

## 6.1 Differential effects by student SES status

Existing studies consistently find that students from lower SES backgrounds were more severely impacted during COVID-19. The theoretical framework in Section 5, suggests that the relative impact of COVID-19 for inequality in terms of retention in HE is, however, unclear for SA given the availability of NSFAS funding and high unemployment rates. We utilise an indicator for whether the student has ever received NSFAS funding

to proxy for lower SES. We include NSFAS status interactions with all key variables included in equation 3. This allows us to examine whether students on NSFAS funding were differentially impacted in 2020.

Different institutions implemented different approaches to coping in 2020 and had different efficiencies in adjusting to online learning. We reflect that the homogeneity of student SES within the institution may have impacted the strategy taken by institutions, with institutions with more heterogeneity in SES of students possibly needing to come up with more than one solution. We therefore order results based on the share of students in the institution originating from a quintile 1-3 home postal code.

## 7 Student dropout in 2020

Table 4 presents estimates of the impact of the 2020 COVID-19 year on student attrition, i.e.  $\beta_3$ ,  $\beta_6$ ,  $\beta_9$  and  $\beta_{12}$  in equation 3. They represent the change in the propensity to drop out in year of study 2 through 5 in 2020 relative to prior years. For each institution type, we present estimates from a specification with and without controls. Table 4 shows significant levels of dropout at each year of study, highest in year 2 and 5 at around 10 percentage points and lower in 3 and 4 at about 6 percentage points. UoTs have slightly higher attrition rates than TUs and CUs in year 2.

Our estimates of the impact of 2020 on dropout show an interesting pattern across year-of-study at TUs and CUs. There is no impact on second year attrition rates, while attrition increases year on year for years 3, 4, and 5. For example, student attrition among those at TUs in 3rd year in 2020 was 1.3 percentage points higher than similar students in previous third year cohorts, this represents a 15-22% increase (using T3 average). The impact of 2020 increases to 2 percentage points for those in year 4 (18-33%) and to 2.3 percentage points for those in year 5 (16-23%). Students enrolled in UoTs appear less impacted. Only those intending to start year 5 in 2020 are found to have an increased likelihood of dropout.

It is worth reflecting on NSFAS funding policy changes that could be part of the

Table 4: Estimates of the impact of the 2020 COVID-19 year on student dropout

VARIABLES	(1) TUs	(2) TUs	(3) CUs	(4) CUs	(5) UoTs	(6) UoTs
T2 = 1	0.097*** (0.007)	0.105*** (0.007)	0.105*** (0.015)	0.109*** (0.016)	0.119*** (0.016)	0.120*** (0.021)
1.T2#1.C <sub>2019</sub>	-0.003 (0.004)	-0.003 (0.004)	-0.002 (0.012)	-0.002 (0.012)	-0.013 (0.019)	-0.005 (0.022)
T3 = 1	0.060*** (0.004)	0.079*** (0.005)	0.055*** (0.009)	0.071*** (0.011)	0.054*** (0.011)	0.076*** (0.014)
1.T3#1.C <sub>2018</sub>	0.013*** (0.004)	0.012** (0.004)	0.021** (0.006)	0.017** (0.005)	0.012 (0.012)	0.004 (0.014)
T4 = 1	0.062*** (0.004)	0.093*** (0.005)	0.061*** (0.010)	0.089*** (0.013)	0.066*** (0.008)	0.102*** (0.007)
1.T4#1.C <sub>2017</sub>	0.020*** (0.003)	0.017*** (0.003)	0.032** (0.010)	0.026** (0.009)	0.029 (0.016)	0.012 (0.018)
T5 = 1	0.104*** (0.007)	0.139*** (0.007)	0.114*** (0.015)	0.143*** (0.017)	0.117*** (0.014)	0.153*** (0.012)
1.T5#1.C <sub>2016</sub>	0.023** (0.008)	0.023** (0.008)	0.058** (0.022)	0.059** (0.021)	0.062*** (0.008)	0.054*** (0.008)
Constant	0.001 (0.002)	0.205*** (0.028)	0.004*** (0.001)	0.175*** (0.018)	0.022* (0.009)	0.222*** (0.044)
Observations	989,730	989,607	485,113	485,113	581,859	473,061
R-squared	0.031	0.065	0.037	0.085	0.038	0.087

Notes: Standard errors that account for repeated individual measures and institution provided in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

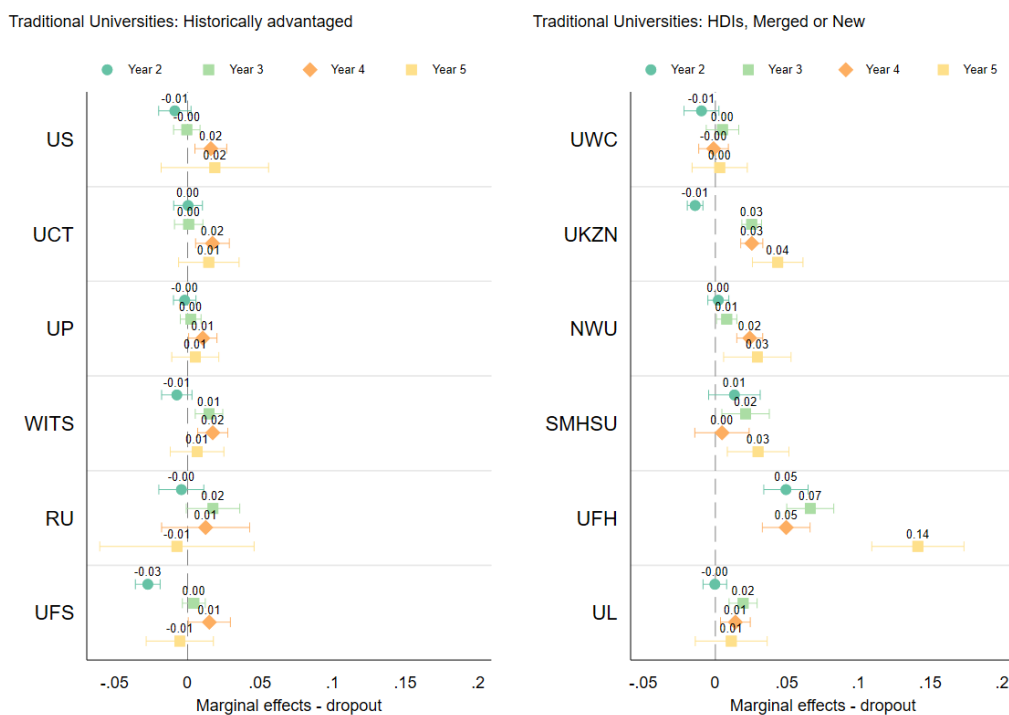
explanation for differences across academic years of study. First, the cohorts entering year 4 and 5 in 2020 started university prior to 2018. As such they qualify for NSFAS under the old policy guidelines - only students from households with income below R122 000 are eligible for funding and the tuition amount is capped, requiring the student to cover possible differences. Thus a smaller share of students were covered by NSFAS in these earlier cohorts, and the cover was less comprehensive, potentially making them more vulnerable to fluctuations in their *NPV* during 2020. Second, NSFAS has changed the n+ rules over time, i.e. the number of years students are eligible for funding. The pre 2018 cohorts are eligible for n+2, the 2018 cohort for n+1 and the 2019 cohort did not have an explicit restriction until 2023. To the extent that students entering second year are already aware of the implications of this policy, the removal of the n+ policy for the 2019 cohort could partly explain the absence of impact for second years <sup>9</sup>. On the other hand, the increasing size of the impact coefficients in later years could also partly reflect that students with below optimal performance who are approaching the end of their funding stream, were more likely to dropout given additional hardships in 2020. For example, students enrolled in 3-year qualifications would be in n+2 in year five, thus

<sup>9</sup>If this is the case, we would not be able to obtain an estimate of the 2020 COVID-19 impact in second year as this group would not have a relevant comparison group.

in their last year of funding eligibility.

Figure 1 and 2 present the 2020 marginal effect estimates for individual institutions grouped by institutional type (with TUs further differentiated as historically advantaged versus not). Institutions in each figure are ranked from top to bottom based on the share of students originating from quintile 1-3 postal codes. For example, US has the lowest share of students in quintile 1-3 postal codes and UFS the highest among historically advantaged TUs.

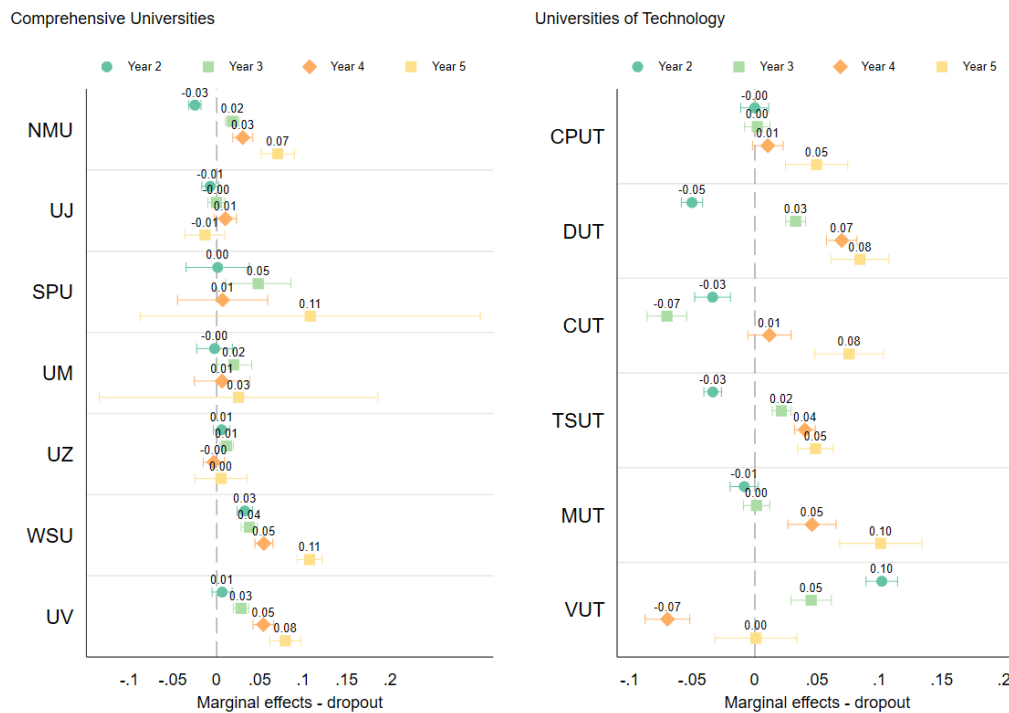
Figure 1: Marginal increase in Dropout in 2020: TUs



The figures show variability in the impact of the 2020 COVID year on student dropout across institutions. Some general conclusions can, however, be drawn from Figure 1. First, there was not much of an impact on dropout rates for students enrolled at most historically advantaged TUs (i.e. coefficients are small in size and few are found to be statistically significant). The only significant impact (found at 3 of the 6 HA TUs) is evident among students entering year 4 in 2020. Second, dropout among students enrolled at historically disadvantaged (HD), merger or new TUs was negatively impacted, with some institutions showing large increases in dropout. Third, the distinctive pattern of an

increasing negative impact by year of study found in Table 4 is evident for HD, merge and new TUs, and four of the six institution have statically negative impacts for most years of study. The negative impact on dropout in 2020 at UFH is stark: 5, 7, 5 and 14 percentage points increases in years 2, 3, 4 and 5, respectively. Fourth, there are exceptions within the group of HD, merge and new TUs. Student attrition at UWC, a previously disadvantaged institution based in the Western Cape, was not negatively impacted in 2020, for example. Increased dropout in 2020 is similarly marginal at UL, a HD institution <sup>10</sup> located in rural Limpopo, with only year 2s facing higher dropout in 2020.

Figure 2: Marginal increase in Dropout in 2020: CUs and UoTs



CU dropout in 2020 has a similar pattern to that observed for HD, merger and new TUs. Three of the seven institution experience significant increases in dropout, becoming more severe with each year of study. Students in WSU and UV, both rural historically disadvantaged institutions, were particularly badly impacted, with dropout increasing

<sup>10</sup>UL was formed in 2005 as a results of the merge of the University of the North (HD) and MENDUSA. However, in 2015, the institution split, with the MENDUSA campus becoming Sefako Makgatho Health Sciences University (SMHSU) and the University of the North campus retaining the name UL.

by 3, 4, 5 and 11 percentage points in years 2, 3, 4 and 5 at WSU and by 3, 5, and 8 percentage points in years 3, 4, and 5 at UV. Yet, no negative impact on dropout in 2020 is found for students enrolled at UZ, a HDI in a rural area.

The pattern observed for most UoTs is quite different. All institutions except VUT found either a reduction in student dropout or no impact for year 2s (for years 2 and 3 at CUT). Yet, the experience of 4th and 5th years was largely negative. For example, there was a 7 and 9 percentage point increase in years 4 and 5 at DUT and a 6 and 10 percentage point increase at MUT. Given that most students at UoTs are enrolled in three year qualifications (see Table 1), year 4 and 5 represents N+1 and N+2 respectively, and hence the sample in these years is characterised by students progressing slower than optimally specified (and approaching the NSFAS funding eligibility maximum).

Next we explore differences between students funded by NSFAS and those not, for each institution. Figure 3 presents marginal effects for HA TUs, by year of study and NSFAS status and Figure 4 presents similar information for HD, merger and new TUs. Figure 3 shows very limited evidence of a differential experience for students funded by NSFAS versus those not at historically advantaged institutions. Indeed, the only statistically significant difference is found for 2nd years at UP. Here NSFAS funded students have a 2 percentage point increase in attrition, while their unfunded peers experienced no increase in attrition relative to prior trends.

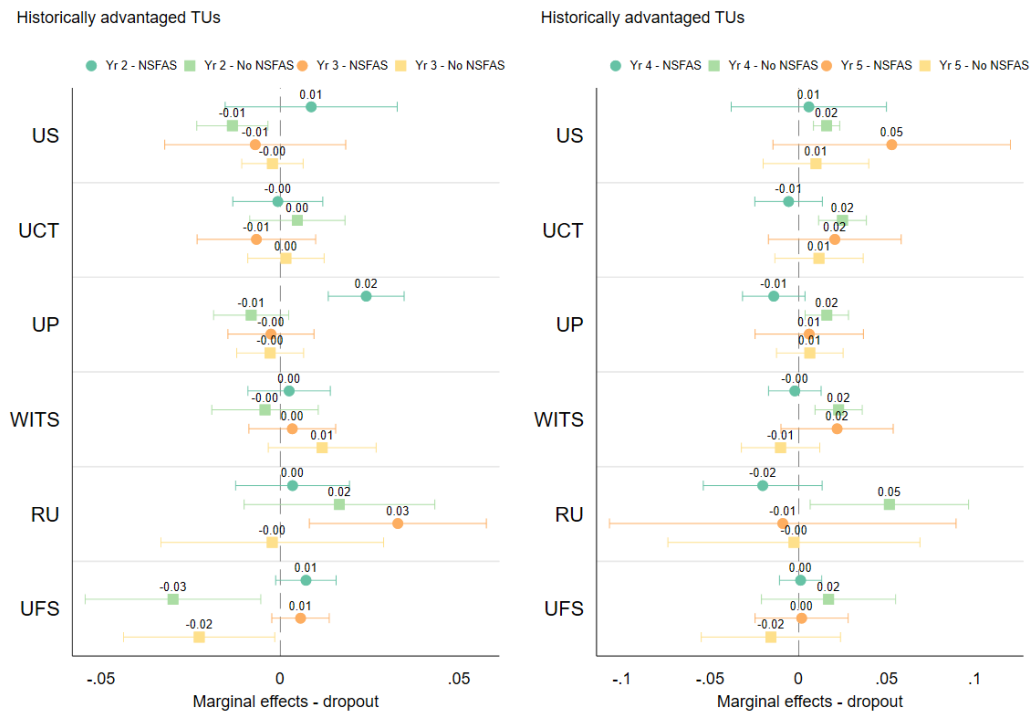
Differences by funding status are more evident at historically disadvantaged, merger and new TUs, but their is not a consistent story. UWC, NMU, UFH and UL all find significant differences in second year attrition rates by funding status. However, at UWC and NWU, NSFAS-funded students have higher attrition while their unfunded peers have lower attrition; at UL unfunded students<sup>11</sup> have lower attrition, with NSFAS funded showing no increase; and at UFH, both funded and unfunded students are negatively impacted in year 2, but unfunded students<sup>12</sup> have significantly higher attrition than their NSFAS funded peers (18 percentage points versus 4 percentage points). A similar pattern - of unfunded students being more severely impacted - is evident for year 3 and 4 students

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<sup>11</sup>Only six percent of the analysis population at UL.

<sup>12</sup>Fifteen percent of students in the analysis population at UFH.

Figure 3: Marginal increase in dropout in 2020: Historically advantaged TUs by NSFAS status



at UFH and year 3 students at UL, with other institutions finding no significant difference between funded and unfunded students in other years.

A similar, mixed picture is evident for CUs (Figure 5). Differences in the marginal effect of the 2020 COVID year between funded and unfunded are insignificant for most institution-year-of-study combinations. UM, UZ, WSU and UV find differences in some years of study and not in others. For example, unfunded students at UM entering year 2 are 16 percentage points less likely to attrit, while their NSFAS funded peers were 2 percentage points more likely to attrit. The opposite, however, is found for 5th year students at UM; NSFAS-funded students are not impacted in 2020, while their unfunded peers were 64 percentage points more likely to attrit. A similar pattern is seen at UV; funded students are worse off in year 2 (3 percentage points versus -12 percentage points) but better off in year 5 (6 versus 20 percentage points). WSU finds a relative benefit for NSFAS funded in year 3 (2 percentage points versus 15 percentage points) and in year 4 (3 percentage points versus 15 percentage points).

Figure 4: Marginal increase in dropout in 2020: Historically disadvantaged TUs by NSFAS status

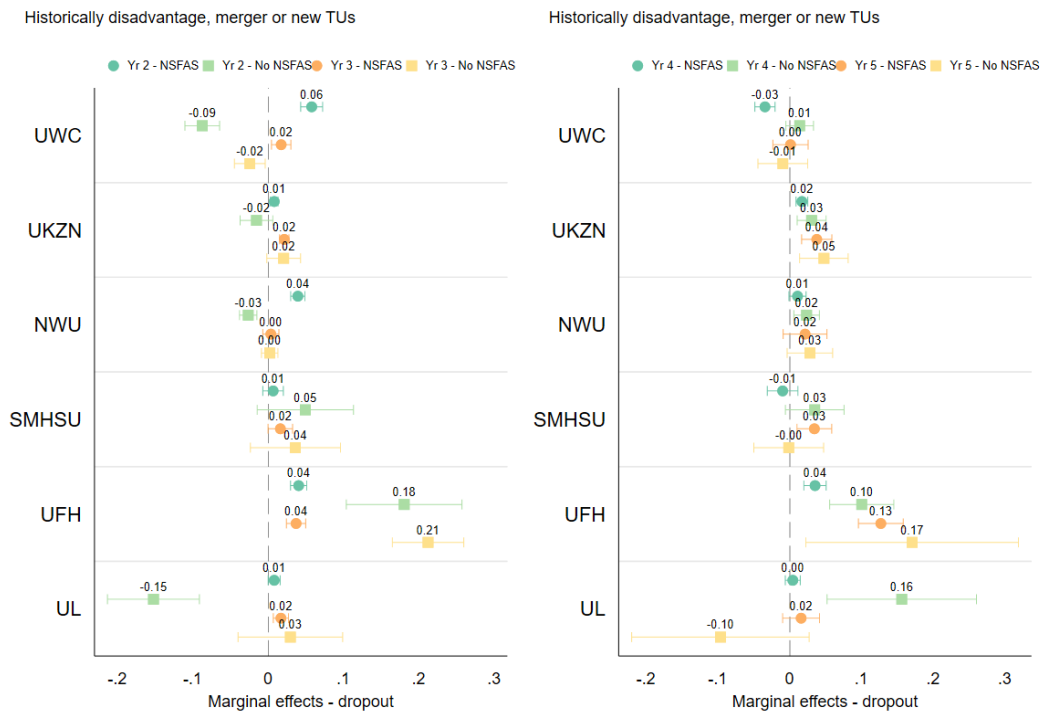
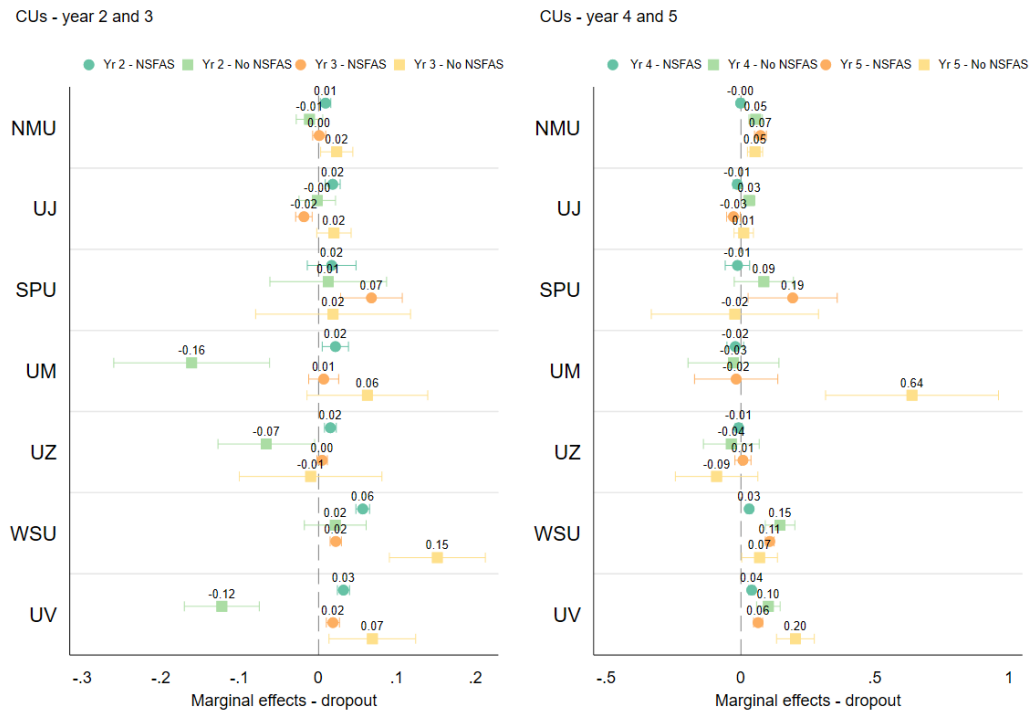
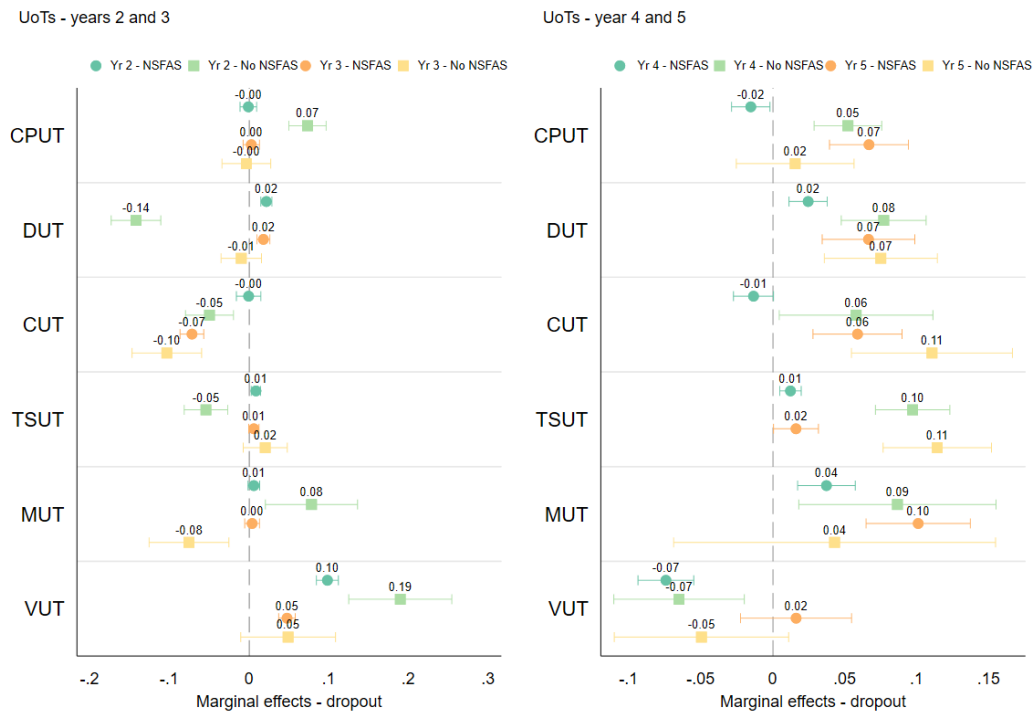


Figure 5: Marginal increase in dropout in 2020: CUs by NSFAS status



The pattern of the impact on attrition in 2020 between funded versus unfunded students is more consistent at UoTs (Figure 6). For institution and year-of-study combinations where attrition increased and there is a significant difference between funded and unfunded student impacts (CPUT 2 4, DUT 4, CUT 4 TSUT 4 5, MUT 2, VUT 2), unfunded students are more negatively affected. The gap ranges between 6 and 9 percentage points. On the other hand, for the three institutions (DUT, CUT and TSUT) where we find significant overall reductions in attrition in year 2 (also year 3 at CUT) in Figure 2, Figure 6 shows that this is driven by unfunded students. For example, unfunded second years at DUT experienced a 14 percentage point decline in attrition in 2020, while their funded counterparts had a 2 percentage point increase. For CUT and TSUT, however, the pattern is about an absence of an improvement for funded second year students rather than a negative impact, per se.

Figure 6: Marginal increase in dropout in 2020: UoTs by NSFAS status



Together, these results suggest that on average, within institution NSFAS funded students do not appear to have been more likely to attrit than their unfunded peers during 2020. Indeed, in institution-year of study combinations where an increase in attrition

was found for both groups, the negative impact tends to be larger for unfunded students. The experience of second years was a bit anomalous to this general finding. Attrition decreased for unfunded students in year 2 at 9 out of our 25 institutions, and in these instances, funded student attrition was either not impacted or increased. Specifically, attrition decreased for unfunded students in second year in UP, UWC, NWU, UM, UZ, UV, DUT, CUT, TSUT, but increased by 0-6 percentage points for funded students. This would explain the absence of a second year impact evident in our aggregate regressions in Table 4. In the next section we attempt to contextualise these finding by examining student, staff, institutional and labour market differences across institutions.

## 8 Discussion

Our theoretical framework highlighted that based on non-monetary costs and benefits, we could have expected an increase in dropout in institutions with a large share of students from lower SES backgrounds. The severity of the negative impact would, however, depend on how an institution responded to the lockdown and how this impacted the relative benefit and cost. On the other hand, based on monetary costs and benefits, the opposite might be anticipated, with funded students being more likely to remain enrolled in 2020 given the safety net provided by NSFAS funding.

A report to Universities South Africa (USAf) on planning for online learning at 6 May 2020 (USAf, 2020) shows that awareness of student needs, levels of optimism around the effectiveness of online teaching, and strategies to implement online learning varied by institutions. Strategies utilised by (some) institutions included 1) a move towards continued assessment rather than exam orientated progress, 2) leniency in the timing of the hand in of assignments, 3) the cancellation of Duly Performed (DP) requirements especially relevant for struggling students who may ordinarily be filtered out before they write exams or the final assessment and 4) extending the academic year into 2021 (five universities concluded the academic year in March 2021, seven in February 2021 and four in January 2021. The remaining 10 completed the academic year in 2020 (Macupe,

2020-09-30).

Table 5 summarises institutional information from 2020 grouped by the number of years of study in which dropout increased in 2020, and sorted within these groups on share of students from quintile 1-3 postal codes. Institutions used a range of different online platforms and were differentially prepared to move online after campus and residences closed following the implementation of national lockdown on 26 March 2020 – just over a month after the start of the academic year. A news article in the Mail and Guardian noted that (Macupe, 2020-09-30):

Universities such as Fort Hare and Walter Sisulu in the Eastern Cape have experienced ongoing student protests over funding and other issues at the beginning of the academic year until the lockdown was implemented.

reflecting that circumstances prior to lockdown also had implications for the move to online teaching and learning.

There was also a drive to understand the context of students such that appropriate strategies could be put in place. Students were surveyed about their needs relating to laptops, data and effective learning spaces. Some universities purchased or provided laptops on loan to students who did not have learning devices. Institutional online sites and e-learning platform were zero-rated, and students received data bundles that they could use to access online resources. For students who could not access the internet in any form, institutions implemented paper based on USB-drive strategies, for example UCT distributed printed learning materials and USB drives so that students could keep up with their courses (UCT, 2020). USAf fund-raised around R3 billion in 2020/2021 from Absa, Standard Bank and Sector Education and Training Authorities (SETAs) to cover laptop, data and bursary costs of students in need (USAf, 2021-06-21, 2022-02-22). During 2020, as lockdown regulations were revised, institutions implemented phased in return of students, with each institution approaching this based on their student's background or programme needs.

Implementing these strategies, however, took time. Table 5 indicates that, according to a USAf report (USAf, 2020), online remote teaching resumed approximately one

month after the initial lockdown at many HA institutions, and resumed before the start of the second semester at other institutions. However, a study of student and teacher experiences in 2020 suggests that while teaching resumed in the first semester, not all modules were moved online immediately<sup>13</sup> (Department of Higher Education and Training, 2020).

Table 5: Institution characteristics

Name	Institution type	Historic type	Province	# negative impacts	Resumed teaching	Online platform	Size	Grad Rate	Student Staff Ratio
UWC	TU	HD	WC	0	April 20	Myclassroom	15-30	.22	22.5
RU	TU	HA	EC	0	May 4	RUconnected	<15	.28	14.7
UJ	CU	Merge	GT	0	April 20	Blackboard	>30	.28	25.6
UM	CU	New	MP	0	April 27	Moodle	<15	.14	27
UZ	CU	HD	KZN	0		UZ e-learning portal	<15	.23	41
UL	TU	Merge	LP	0		Blackboard	15-30	.22	25.4
US	TU	HA	WC	1	April 20	SUNLearn	15-30	.28	19.9
UCT	TU	HA	WC	1	April 20	Sakai	15-30	.26	13.3
UP	TU	HA	GT	1	May 4	Blackboard	>30	.25	24.9
CPUT	UoT	Merge	WC	1	June 1	Blackboard	15-30	.25	24.3
SPU	CU	New	NC	1	May 4	Unknown	<15	.16	18
UFS	TU	HA	FS	1	May 4	Blackboard	15-30	.21	29.7
CUT	UoT	HA	FS	1	April 20	Blackboard	15-30	.22	39.3
WITS	TU	HA	GT	2	April 20	Sakai and Moodle	15-30	.24	13.4
SMHSU	TU	New	GT	2		Unknown	<15	.18	6.9
MUT	UoT	HD	KZN	2	June 1	Blackboard	<15	.18	42.5
VUT	UoT	HA	GT	2	June 1	Blackboard	15-30	.19	27.5
NMMU	CU	Merge	EC	3	April 28	Moodle	15-30	.24	27.3
UKZN	TU	Merge	KZN	3	May 4	Moodle	>30	.24	27.9
NWU	TU	HD	NW	3	April 20	Sakai	>30	.23	28.9
DUT	UoT	Merge	KZN	3	June 1	Blackboard	15-30	.26	37.4
TSUT	UoT	Merge	GT	3	June 1	Blackboard	>30	.25	26.4
UV	CU	HD	LP	3	April 6	Blackboard	<15	.18	29.4
UFH	TU	HD	EC	4		Blackboard	<15	.18	34.9
WSU	CU	Merge	EC	4		Blackboard	15-30	.21	32.8

A news article from the end of July 2020 states that (Macupe, 2020-07-25):

Students from University of Venda, the University of Fort Hare and University of Zululand said they were still waiting for laptops and data, adding that there has been little communication from their institutions about plans to continue with their studies. ... A number of students at the university said it was only recently that they started their studies using WhatsApp. Their lecturers host

<sup>13</sup>Students take 7-9 courses on average whereas only 18, 12 and 8 percent of students at TU, CUs and UOTs indicated that 7+ modules were online in the first semester.

discussions and interact with students on the social media platform, as well as give them tasks to do.

Indeed, news articles from USAf suggest that students were still receiving laptops in December 2020, suggesting that they had done without until then. Therefore the resume dates in Table 5, do not necessary speak to the experience of all students at these institutions. That being said, institutions in the bottom couple of panels, the institutions where dropout was more severely impacted, have later or unknown dates for when teaching resumed, suggesting that the delay in resuming teaching may have impacted student retention.

Blackboard is the most common online learning platform, used by 13 institutions, followed by Moodle (4) and Sakai (3). Four institutions (US, RU, UWC, UZ<sup>14</sup>) appear to have customised online learning packages. Interestingly, these four institutions also experienced very limited (classified as having at most one academic year experiencing a negative impact) differential student dropout in 2020.

There is not clear relationship between increased dropout in 2020 and province, institution type and historic type. While all the institutions in the bottom two panels are CUs or UoTs, historically disadvantaged or a result of institutions that merged (typically including historically disadvantaged campuses), and 6 out of 7 are either in relatively rural areas or in KZN, the institutions with no increased dropout are a mixture of institutional and historical types, with 5 out of the 6 institutions based in at least semi rural areas. Most of the historically advantaged institutions are found in the middle two panels, indicating that a negative impact was found in one or two years of study.

Next, Table 6 explores differences in undergraduate student characteristics, with the table similarly sorted by the number of years of study where an increase in dropout was found in 2020 and share of students from quintile 1-3 postal codes. Information in the first seven columns is compiled from HEMIS records, with the last four columns originating from Census 2011 data matched to student home postal addresses. No definitive patterns emerge. There are institutions in the bottom panel (where students are most negative

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<sup>14</sup>Based on Moodle.

Table 6: Institution student characteristics

Name	Institution type	Historic type	# negative impacts	Share Black	Share on NSFAS	Share in Residence	Elec- tricity	Unemp	HHsize >6	Urban
UWC	TU	HD	0	.48	.46	.04	.86	.1	.08	.67
RU	TU	HA	0	.79	.6	.68	.78	.1	.08	.48
UJ	CU	Merge	0	.9	.72	.16	.79	.14	.07	.6
UM	CU	New	0	1	.87	.3	.73	.11	.09	.13
UZ	CU	HD	0	1	.94	.34	.62	.12	.2	.2
UL	TU	Merge	0	1	.92	.34	.7	.14	.08	.13
US	TU	HA	1	.15	.24	.43	.95	.06	.08	.6
UCT	TU	HA	1	.35	.37	.39	.89	.09	.05	.75
UP	TU	HA	1	.47	.37	.27	.82	.09	.05	.63
CPUT	UoT	Merge	1	.7	.72	.34	.81	.11	.08	.55
SPU	CU	New	1	.74	.76	.51	.69	.08	.06	.12
UFS	TU	HA	1	.84	.76	.19	.7	.11	.09	.29
CUT	UoT	HA	1	.96	.78	.07	.73	.1	.05	.27
WITS	TU	HA	2	.68	.5	.24	.82	.12	.06	.66
SMHSU	TU	New	2	.94	.79	.86	.73	.14	.08	.36
MUT	UoT	HD	2	1	.91	.75	.67	.12	.16	.32
VUT	UoT	HA	2	.99	.83	.49	.76	.16	.07	.49
NMMU	CU	Merge	3	.76	.74	.4	.74	.11	.09	.44
UKZN	TU	Merge	3	.83	.82	.57	.7	.12	.14	.4
NWU	TU	HD	3	.65	.53	0	.73	.11	.06	.35
DUT	UoT	Merge	3	.9	.56	.64	.69	.12	.14	.36
TSUT	UoT	Merge	3	.98	.85	.25	.73	.14	.09	.38
UV	CU	HD	3	1	.74	.14	.69	.14	.07	.08
UFH	TU	HD	4	.98	.84	.56	.63	.11	.12	.26
WSU	CU	Merge	4	.99	.93	.69	.58	.12	.15	.24

impacted) that match those in the top panel (where no negative impacts on dropout in 2020 are found).

It is worth reflecting on differences in NSFAS support based on accommodation groupings described in Section 3. Table 6 shows the share of students on NSFAS funding in 2020 as well as the share of students in residences in 2019<sup>15</sup>. In four of the six institutions in the top panel (least impacted by 2020), close to three quarters or more of their students are funded by NSFAS (72-94%). Yet a third or less of students in these institutions were housed in residences in 2019, suggesting a relatively large share of NSFAS funded students in private or home accommodation. Institutions in the bottom panel, where negative impacts are found in all years, also have a high share of NSFAS funded students, but the share in residence in 2019 is also larger, suggesting that a larger share of students funded by NSFAS would have needed to change their living arrangements in 2020. UFH and WSU also experienced student protests in early 2020, prior to the lockdown related

<sup>15</sup>We use information from 2019 to avoid possible changes in residency reporting due to the pandemic in 2020

to funding issues.

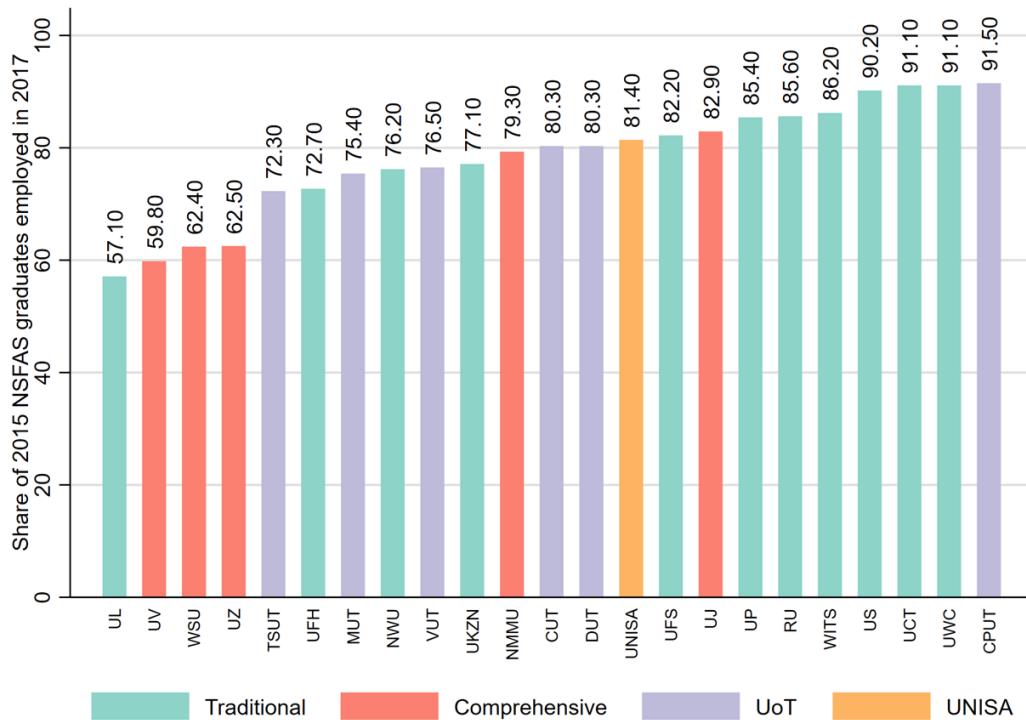
Although the pattern is suggestive, there are exceptions. Focusing on institutions with more than 72% of their students funded by NSFAS (17 institutions), 7 of the 8 institutions in the top two panels (least impacted) have residence shares below 34%, fitting with the narrative that being in private or home residence was less disruptive. However, 2 of the 6 institutions (UV and TSUT) in the bottom two panels (most effected) also have residence shares below 34%.

Institutional average student postal code characteristics, as captured in the Census 2011, correlate strongly with the share of students on NSFAS funding but do not provide much nuance in explaining differential impacts between the top and bottom two panels. In particular, students attending HA institutions and institutions in urban metros, typically come from postal codes with higher electricity connectivity, lower unemployment and smaller household sizes. The students in institutions in the bottom and top panels originate from more disadvantaged postal codes.

Appendix Table 8 summarises staff characteristics by institution, sorted by impact of covid on dropout severity. There are no clear patterns related to staff demographic (age sex race South African status), experience or academic qualification level. The number of academic staff and the ratios of support or technicians to academic staff also provide no definitive picture of potential channels through which increased dropout in 2020 may have played out.

Finally, Figure 7 presents the share of 2015 NSFAS graduates by institution who were employed in 2017 (Wildschut et al., 2020), as a proxy for  $Y_D$ , the return to completing a qualification, albeit in terms of employment rather than earnings. There is no clear evidence that patterns of increased dropout by institution can be explained by labour market returns. On the one hand, nine (CPUT, UWC, UCT, US, RU, UP, UJ, UFS, CUT) of the eleven institutions least impacted by increased dropout in 2020, also have the highest employment rates for NSFAS students (WITS the exception here). This aligns with retention being associated with higher marginal financial benefits. On the other hand, the remaining two institutions least impacted by dropout in 2020 (UL and UZ) are

Figure 7: Share of 2015 NSFAS graduates employed in 2017



Source: Based on Wildschut et al. (2020).

among the four institutions with the lowest employment absorption rates.<sup>16</sup>

The institutional and student characteristics of UL and UZ (and to a lesser extent UJ and UM), make them stand out as anomalous. In both institutions, more than 92% of students are supported by NSFAS funding, with under 20% originating from urban postal codes. Yet, dropout is 4.5% and 4% relative to a system average of 6.4%, and student attrition was not differentially impacted in 2020. Other institutions with similar characteristics to UL and UZ are those with the largest negative impact on retention (i.e. UFH, UV, and WSU).

Our findings from the analysis accord with growing evidence that COVID-19 differentially impacted students from lower socioeconomic backgrounds. They also illustrate the social safety net provided by the NSFAS bursary during this difficult time. The review of average institutional, student, staff and labour market characteristics

<sup>16</sup>That being said, these relatively lower absorption rates for UL and UZ are likely to dwarf the labour market absorption rates of youth without qualifications in these areas. A more useful measure would be the relative return to completing a qualification versus dropping out, which we do not have.

illustrates, however, that the severity of the impact of 2020 for dropout, cannot easily be correlated with characteristics that we can measure.

This accords with our theoretical framework that the overall effect of closures and the implementation of online learning on dropout in 2020 is uncertain owing to the array of interacting and inseparable factors. Moreover, a number of factors - typically the relational aspects important in determining student retention - are not observed in our data. The examples of UZ and UL provide suggestive evidence that this may be the case.

## 9 Concluding remarks

We set out to document the effects of university closures on undergraduate students' dropout at all public contact universities in South Africa. South Africa typifies a high inequality setting with deep class, race, and income stratification, particularly in access and completion of tertiary education. In countries where educational and socioeconomic inequalities remain intrinsically intertwined, any circumstantial shift in either educational or socioeconomic outcomes will affect the other. Heightened economic instability during the pandemic will have impacted students living in lower SES households more intensely, but the way that inequalities play out in the education system post-pandemic will feed back into society too.

Overall, we find that student dropout increased in 2020 for students in 3-5th year, with little evidence of a change for those entering their second year of study. These aggregate findings mask significant differences across institutions. Students enrolled in historically advantaged traditional institutions, and some comprehensive institutions, were not significantly affected, whereas dropout increased significantly at the University of Fort Hare (UFH), Walter Sisulu University (WSU) and the University of Venda (UV), three historically disadvantaged institutions located in rural areas. No difference in retention is found, however, for students enrolled at the University of Zululand (UZ) or the University of Limpopo (UL), two equally resource-disadvantaged institutions where a majority (over 90%) of students are funded via NSFAS. Furthermore, at institutions

where dropout increased, NSFAS-funded students were less impacted than their unfunded peers.

A key motivating factor for this work was to document differences in retention across students from different socioeconomic backgrounds to understand the implications for inequalities in the sector. Our overall findings accord with growing evidence that COVID-19-related changes in the sector differentially impacted students from lower socioeconomic backgrounds. However, they also illustrate that the NSFAS bursary appears to have provided a social safety net during this time, and the examples of UZ and UL provide suggestive evidence that institutional relational aspects within institutions may have been important too.

The protective role potentially played by NSFAS funding during the COVID-19 crisis, raises the question of whether we fully understand the implication of access to NSFAS funding within the higher sector more generally. The theoretical framework we draw on highlights that the context in South Africa - full cost of study funding together with poor labour market opportunities for those without a qualification - make studying a logical, if not necessarily a globally optimal, option. This warrants further research, especially given concerns over the financial sustainability of the higher education sector.

Our results reveal a nuanced story about factors influencing retention that, when considered together with the spurious improvements in academic performance evidenced during the pandemic, have potential consequences for the shape and long term academic performance of students. For institutions grappling with student success, and for a sector seeking to dismantle its role in perpetuating cycles of inequality, recognising what motivates students to remain enrolled is of obvious importance. Without interventions that recognises that not only could the negative effects of the pandemic continue to play out over time, but that the compositions of the enrolled student body has changed as a result of the pandemic, gaps may continue to widen over time. This will be important to bear in mind as institutions consider the role of online learning in a post-COVID era, and in thinking about how to cope with future shocks to the system.

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# Appendix A

Table 7: Student characteristics by income quintile: FTEN 2020

	All	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
age	20.529	20.571	20.75	20.747	20.454	20.063
female	.564	.534	.557	.579	.587	.575
race1	.797	.99	.967	.85	.683	.474
race2	.058	.003	.008	.054	.128	.109
race3	.03	.002	.007	.012	.075	.059
race4	.104	.003	.015	.078	.103	.326
race5	.012	.002	.003	.006	.011	.032
evernsfas	.589	.745	.706	.666	.541	.347
inres2019	.329	.4	.338	.268	.31	.322
educhighyears.indiv	6.854	5.468	6.197	6.6	7.272	8.786
noschool.indiv	.077	.109	.095	.081	.064	.031
grade12.indiv	.168	.107	.15	.165	.199	.222
bachelors.indiv	.016	.004	.005	.009	.014	.047
postschool_any.indiv	.095	.029	.045	.063	.098	.242
postschool_highvalue.indiv	.074	.02	.03	.044	.072	.2
emp_employ.indiv	.471	.25	.407	.517	.568	.631
emp_unemp.indiv	.116	.144	.147	.126	.099	.065
emp_disc.indiv	.05	.094	.064	.047	.029	.013
emp_nea.indiv	.363	.512	.382	.311	.304	.291
annualincome_hh	122158.8	33829.43	54634.53	78094.46	127884.9	314486.4
elec_light_hh	.74	.541	.683	.745	.819	.93
internet_hh	.098	.014	.036	.056	.103	.279
pipewater_hh	.446	.118	.289	.425	.597	.822
cell_hh	.878	.828	.86	.874	.883	.945
computer_hh	.224	.049	.104	.165	.272	.53
car_hh	.319	.115	.184	.27	.384	.645
dvdplayer_hh	.502	.332	.429	.492	.556	.712
radio_hh	.668	.569	.647	.666	.681	.782
refrig_hh	.582	.379	.507	.555	.642	.838
sattv_hh	.242	.085	.148	.195	.29	.495
wshmch_hh	.304	.074	.151	.26	.391	.651
qualtype1	.037	.035	.046	.04	.044	.023
qualtype2	.289	.356	.345	.307	.268	.167
qualtype3	.002	.002	.002	.001	.001	.001
qualtype4	.003	.001	.002	.004	.005	.005
qualtype5	.505	.453	.469	.5	.526	.582
qualtype6	.164	.152	.136	.148	.157	.222
Sample	131833	27838	23889	24289	24118	26019

Table 8: Institution staff characteristics

Name	Institution# type	Age negative impacts	Female	White	South African	Years employed	PhD	Prof	Perm	Sup: Acad	Tech: Acad	Acad	
RU	TU	0	45.5	.48	.6	.91	8.6	.52	.12	.7	1.41	.15	510
UWC	TU	0	46.7	.52	.26	.9	7.3	.5	.13	.66	2.54	.13	1016
UL	TU	0	43.2	.39	.07	.94	7.1	.3	.07	.79	.86	.14	782
UJ	CU	0	43.1	.46	.42	.72	6	.39	.03	.28	1.47	.04	4683
UM	CU	0	42.7	.42	.23	.91	3.8	.47	.02	.87	1.77	.25	146
UZ	CU	0	46.8	.39	.14	.87	6.6	.44	.06	.71	1.75	.1	452
US	TU	1	43.5	.51	.67	.92	8.1	.2	.07	.32	2.45	.29	3682
UP	TU	1	46.2	.53	.66	.87	4.7	.48	.13	.39	3.31	.17	3107
UCT	TU	1	36.8	.52	.48	.77	3.5	.25	.06	.27	2.05	.08	4423
UFS	TU	1	41	.53	.57	.91	5.2	.32	.06	.39	1.32	.21	2447
SPU	CU	1	43.5	.42	.21	.78	2	.38	.01	.91	2.28	.05	131
CPUT	UoTs	1	46.3	.45	.3	.87	6.4	.22	.02	.52	2.54	.1	1481
CUT	UoTs	1	41.8	.5	.36	.92	5.6	.23	.01	.47	1.98	.12	646
WITS	TU	2	43.5	.52	.45	.79	8.3	.26	.06	.21	.57	.13	5693
SMHSU	TU	2	43.1	.55	.09	.96	4.8	.18	.04	.46	.74	.02	1388
VUT	UoTs	2	42.1	.43	.26	.8	5.2	.21	.01	.39	1.64	.2	969
MUT	UoTs	2	44.9	.37	.07	.88	8.5	.17	0	.79	1.8	.26	280
NWU	TU	3	43.2	.49	.63	.96	6.9	.44	.12	.78	3.2	.16	2025
UKZN	TU	3	42.1	.47	.18	.85	6.4	.39	.07	.55	2.09	.7	2281
NMMU	CU	3	45.7	.49	.57	.93	3.8	.23	.11	.29	1.7	.05	2351
UV	CU	3	46.5	.37	.04	.84	7.3	.36	.06	.78	.73	.09	550
DUT	UoTs	3	46.2	.47	.21	.91	5.8	.35	.01	.39	1.51	.11	1567
TSUT	UoTs	3	45.7	.41	.31	.9	5	.21	.03	.35	2.15	.02	2664
UFH	TU	4	45.9	.44	.2	.79	6.9	.41	.09	.77	5.21	.08	461
WSU	CU	4	47.2	.45	.08	.9	9.2	.17	.02	.69	.95	.08	888



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