

Assessment matters: What can we understand about the National Senior Certificate results during COVID-19 from university entrance exams?

COVID-Generation Research Note

By Emma Whitelaw & Nicola Branson
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Assessment matters: What can we understand about National Senior Certificate results during COVID-19 from university entrance exams?

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ABSTRACT

This study examines the association between National Senior Certificate (NSC) performance and National Benchmark Test (NBT) scores among applicants to the University of Cape Town (UCT). Premised on the assumption that although the NSC and NBT measure different academic attributes, their relationship should remain consistent over time for similar students, we examine trends in the relationship between these scores to gain insight into COVID-19-related learning changes. We show that applicants' admission point scores, derived from NSC grades, have risen relative to NBT scores, which remained similar over time since the onset of COVID-19. Gains were more prominent among relatively more disadvantaged applicants and those at the bottom of the performance distribution. This could indicate grade inflation in the NSC associated with the pandemic, or other factors such as shifting subject combinations. Focusing on Mathematics, the comparison of NBT and 2021 NSC Mathematics scores corroborates a grade inflation theory, but NSC results reverted close to pre-pandemic levels in 2022. Evidence of minimal change in subject combinations among UCT applicants further corroborates grade inflation as a source of the NSC performance changes.

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² Both authors are affiliated with the University of Cape Town. The authors are grateful to Martin Gustafsson and Gabrielle Wills for insightful comments on this work.

1 INTRODUCTION

Results of the school-exit assessment, the National Senior Certificate (NSC), are an important metric of human capital that can influence students' future prospects and determine eligibility for higher education. The quality assurance body for the NSC, Umalusi, implements various standardisation undertakings, including moderation of the exam papers, marker moderation, and standardisation of results. This latter process is termed 'norms-referencing', since the distribution of raw marks for each subject can be adjusted to align with five-year rolling averages (Department of Basic Education, 2021).³ However, the subjects to which adjustments are made are not disclosed, and few other comparable data sources exist, making it challenging to assess consistency in learning over time.

One avenue of achieving this, however, is to compare NSC results to those of the National Benchmark Tests (NBTs). NBTs are a set of standardised tests, written by university applicants. Unlike the NSC, which is intended to sort and rank students, usually on a curve (Prince, 2016), the 'criterion-referenced' NBTs determine if students meet specific learning criteria for higher education. While the NSC and NBTs measure different academic attributes (le Roux and Sebolai, 2017), changes in the relationship between the two over time for similar students could offer insights into academic performance, particularly COVID-19-related learning changes.

To explore this, we examine applications data from the University of Cape Town (UCT).⁴ This means that we observe only part of an NSC cohort, as illustrated in Figure 1.

Before further detailing this data, we briefly provide additional context about the NSC and NBTs.

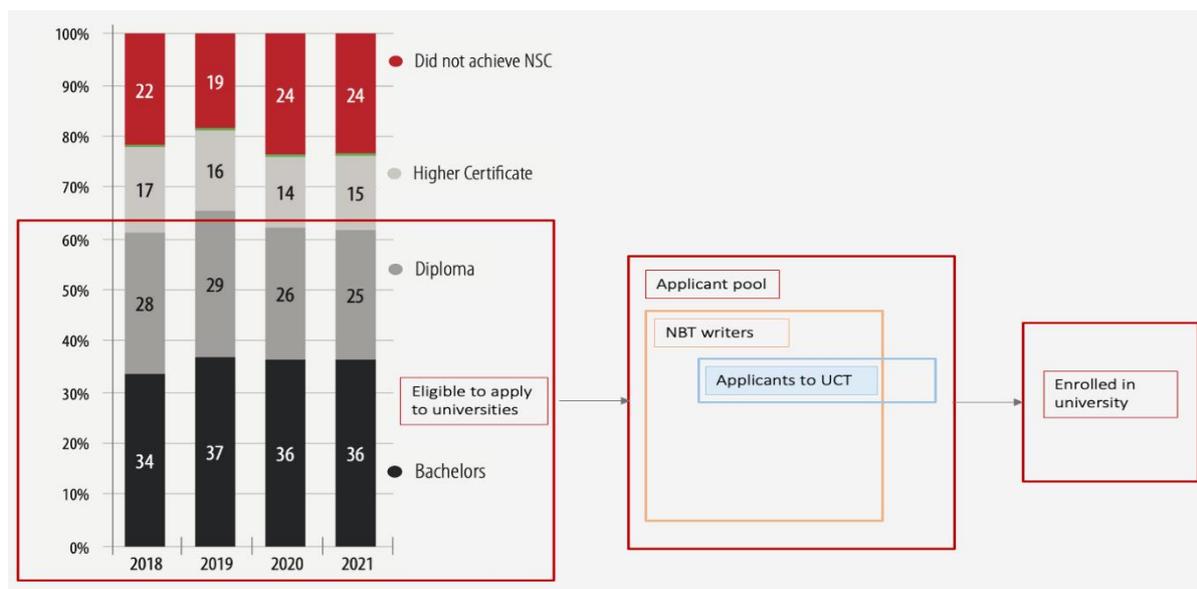
2 THE NSC AND NBTs

To be academically eligible for admission to certain South African universities students typically write two sets of standardised tests: the NSC and NBTs. NSC exams, written annually by all secondary school leavers at the end of their twelfth grade, assess readiness to exit the school system and the extent to which learners meet curriculum expectations in various subjects. The NBTs provide a complementary measure of students' academic preparedness for university, thereby also guiding the creation of suitable teaching and learning environments.⁵

³ Statistical moderation is implemented to eliminate the effect of factors other than the learners' knowledge, abilities, and aptitude on their performance (Umalusi, 2021).

⁴ Data containing both NBT and NSC results is not available in national-level data sources.

⁵ For further details see Prince (2016). Faculties use NBT information in different ways, if at all. See the current NBT requirements by faculty at UCT in Table A1 in the appendix.

Figure 1: Infographic of UCT subsample

Note: NSC figure and data from Wills & van der Berg (2022) – share of full-time candidates by type of NSC pass from the Department of Basic Education data. The 2022 NSC group is not represented here. Note that subsamples are not illustrated proportional to size and are for visualisation purposes only.

The NBTs comprise three tests. The Academic Literacy (AL) Test evaluates students' ability to engage with academic study in the language of instruction (English at UCT). The Quantitative Literacy (QL) Test assesses students' capability to solve problems in a real context that is relevant to higher education study, using basic quantitative information. The Mathematics (or Maths) Test evaluates a student's proficiency in mathematical concepts taught in the secondary school curriculum.⁶ NBT results are used in determining UCT admission eligibility in addition to NSC performance and do not replace the use of NSC grades.

UCT applicants' NSC results are aggregated into a measure called the Admission Point Score (APS). It is this score that we use in comparison with NBT scores. APS is computed by adding together a student's NSC marks for English and the five best other subject percentages, excluding Life Orientation, but including required subject(s) for the relevant programme (see [UCT Admission Requirements](#)). APS is therefore a score out of 600, computed in a consistent manner over time. For ease of interpretation, we divide APS by 6 to get an average score out of 100.

It is relevant to note that NSC subject compositions can change over time. Shifts in subject combinations could contribute to movements in average APS relative to NBT scores. Detailing compositional shifts in subject choice among applicants is beyond the scope of this study but it is important to note that shifts over time in NSC subject compositions could inflate or deflate average APS relative to NBT results. That said, as Figures A1 and

⁶ The Maths NBT is typically written only by those who are applying for a program that requires Mathematics, thus will not be written by those who take the NSC Mathematics Literacy.

A2 in the appendix reflect, the share of applicants in our sample taking the most common subjects has remained relatively stable over the period that we study.

3 UNIVERSITY APPLICATIONS DATA

The UCT applications data is anonymised individual-level data that includes APS, NBT results, and subject-specific NSC scores (for those who wrote) of all students who applied to UCT in a given year. Final test and examination results are sourced by UCT directly from the examining authorities and combined with information from students' application forms.

Our sample comprises students who wrote the Department of Basic Education (DBE) NSC and applied to UCT the year immediately following Grade 12. Our data spans from 2019 to 2023, meaning we consider students who wrote the NSC between 2018 and 2022 (i.e. applied for UCT admission between 2019⁷ and 2023). We exclude those who wrote the NSC in 2020, as NBTs were not required for admission in 2021 due to pandemic circumstances.⁸ NBTs were reintroduced for 2022 and 2023 admission.

Table 1 shows the mean characteristics of applicants by their NSC year. The sample in the table is restricted to applicants with complete APS, AL, and QL results.⁹ Generally, our 2021 NSC group shows similar trends in student performance on the NBT benchmarks when compared to the national cohort of students who wrote NBTs for 2022 admission (see The National Benchmark Tests Project, 2023).¹⁰

The majority of applicants attended quintile 5 schools, or schools without a quintile (likely to be private/independent schools). Applicants from quintile 1 and 2 schools are a minority, comprising just 11% of the applicant pool across years (10% for 2021). The share of students applying for university-provided housing has remained consistent, but the share of students submitting financial aid applications rose following the onset of the pandemic. We observe higher average APS among the 2021 and 2022 NSC groups, but marginally lower scores in the AL and QL NBTs compared to the 2018 and 2019 NSC groups. An exception is the AL average for the 2021 group, which increased by 0.5 percentage points from 2019. This is further investigated by examining the distribution of NBT marks, presented in Figure 2.

⁷ We exclude earlier years since prior to the 2019 admission cycle the EBE faculty required NBTs and included results in their faculty's point scores. This meant a somewhat different distribution of NBT scores before 2019.

⁸ For a discussion on potential learning losses among this group see Branson, Ranchhod, and Whitelaw (2023).

⁹ Table A3 in the appendix shows the full sample of applicants, inclusive of those with missing scores. Our analysis sample comprises slightly more female applicants. Applicants from quintile 5 schools are slightly underrepresented in the two pre-pandemic groups in our sample compared to the full sample and are slightly overrepresented in our sample for the 2021 and 2022 NSC groups.

¹⁰ The slight variations in average characteristics between our sample and the national cohort of NBT writers can be attributed to differences in sample construction and the fact that a potentially more 'select' sample applies to UCT. At the time of writing, there was no publicly available report on the group that wrote NBTs for 2023 admission (i.e. the 2022 NSC group).

Table 1: Mean characteristics of UCT applicant pool by NSC year

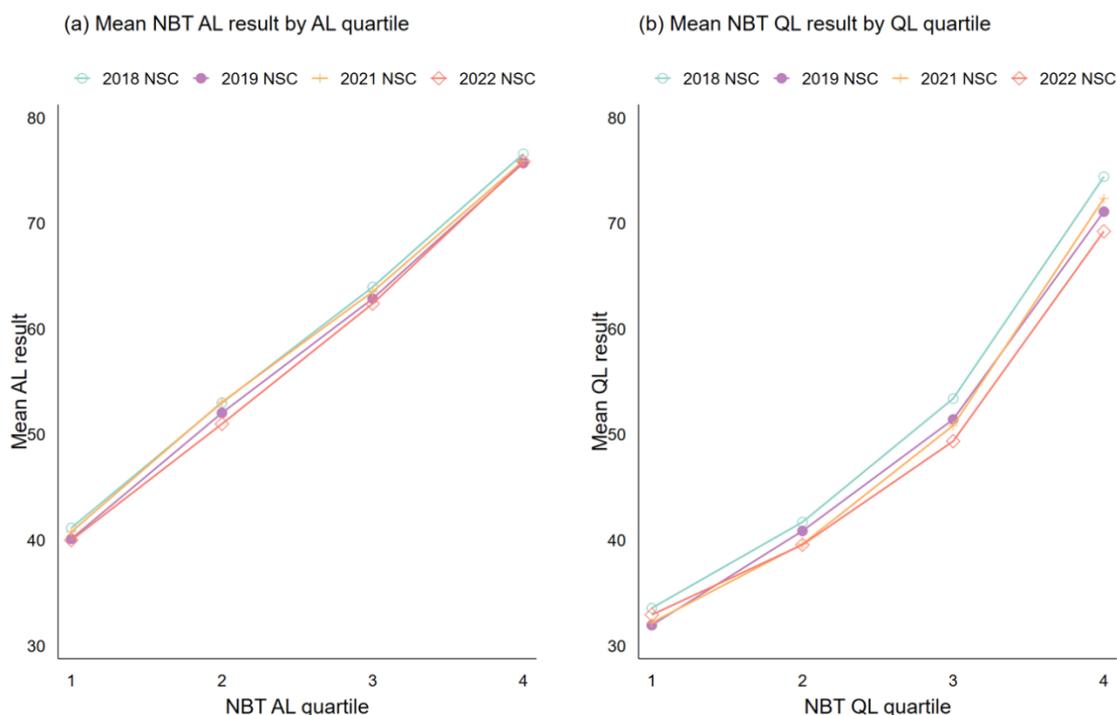
Student characteristics	NSC 2018	NSC 2019	NSC 2021	NSC 2022
Female	0.61	0.63	0.68	0.69
Age	19.85	19.85	19.85	19.84
School Quintile 1	0.04	0.04	0.04	0.04
School Quintile 2	0.07	0.07	0.06	0.07
School Quintile 3	0.13	0.13	0.12	0.13
School Quintile 4	0.13	0.12	0.13	0.13
School Quintile 5	0.49	0.49	0.51	0.49
No school quintile/private	0.14	0.14	0.13	0.14
Applied for financial aid	0.69	0.69	0.73	0.78
Applied for housing	0.79	0.79	0.78	0.79
Academic performance				
Average Admissions Point Score (APS)	65.75	65.48	67.21	66.96
NBT Academic Literacy (AL) result	58.18	57.40	57.91	56.94
NBT Quantitative Literacy (QL) result	50.29	48.42	48.37	47.18
NBT Math result	44.65	44.13	42.17	44.16
Math missing	0.17	0.18	0.22	0.20
Observations	16 905	17 576	18 756	20 608

Note: Sample is restricted to the applicant pool who wrote the DBE NSC the year prior to applying.

The data in Figure 2 do not suggest that applicants' AL preparedness shifted drastically over the four years, although average AL in the top quartiles¹¹ of the performance distribution (3 and 4) does drop for the 2022 group. The stability in performance for the 2021 group could mean that the pandemic did not greatly impact applicants' performance on the measured criteria. Alternatively, there might be some inflation in results due to optional online NBTs in 2021 and 2022. We discuss the latter point later in this section.

¹¹ Quartiles are calculated independently for each NSC group.

Figure 2: UCT applicants' average NBT Academic Literacy (AL) and Quantitative Literacy (QL) score by AL and QL quartile



Note: Sample is restricted to the applicant pool who wrote the DBE NSC the year prior to applying.

Average QL performance, on the other hand, shows a more noticeable decline for those in quartile 2 of the 2021 distribution, and particularly at the top end of the distribution for the 2022 group. However, it's important to note that a similar drop in QL performance occurred between the 2018 and 2019 groups. This drop in 2022 average performance should thus not be conclusively attributed to the pandemic.

Since we observe that NBT quartiles remain relatively consistent over time, we use these to benchmark changes in the NSC. We begin by considering AL and QL, then considering Maths separately thereafter. Before proceeding, however, we consider four important caveats.

3.1 Caveats

First and importantly, we do not establish a causal relationship between performance and the circumstances during the pandemic. Neither do we causally identify learning losses or gains. Second, our results are based on a select sample of students who apply to a top university in the country. To the extent that NSC writers who do not apply to university, or apply elsewhere, were more disadvantaged by the pandemic, our findings may underestimate the true effect of the pandemic.

Third, our discussion assumes that the composition of the UCT applicant pool is comparable before and during the pandemic (i.e. compositions did not shift in ways that are related to the performance on the NSC or NBTs during the pandemic period). If inflated performance motivated a different type of student to apply, this assumption may not hold.

Additionally, if the relationship between the NBTs and NSC results changed over time due to factors like online testing or shifts in the socioeconomic backgrounds of applicants, our results may not reflect the real extent of pandemic-related shifts (or lack thereof).¹²

Lastly, since 2021, NBTs have been offered online and in-person. We cannot observe who wrote which version of the test. It is reassuring that NBT averages by quartile do not vary substantially, but we also need to assume that online and in-person test takers did not perform differently (before and during the pandemic) in ways that relate to their NSC performance.

4 RESULTS

4.1 APS and NBT Achievement Comparisons

Figure 2 shows that 2021 and 2022 AL and QL results are either similar to or below those from pre-pandemic years. Figure 3, on the other hand, shows that average APS for 2021 and 2022 consistently surpasses the closely aligned averages of the 2018 and 2019 groups across the distribution of AL and QL scores. This includes the substantial change in the gradient of average APS, particularly apparent for the 2021 group at the higher end of the AL score distribution. This change of approximately 1-2 percentage points in average APS at a given NBT score suggests a shift in the relationship between the two assessments, hinting somewhat at potential inflation in the NSC.

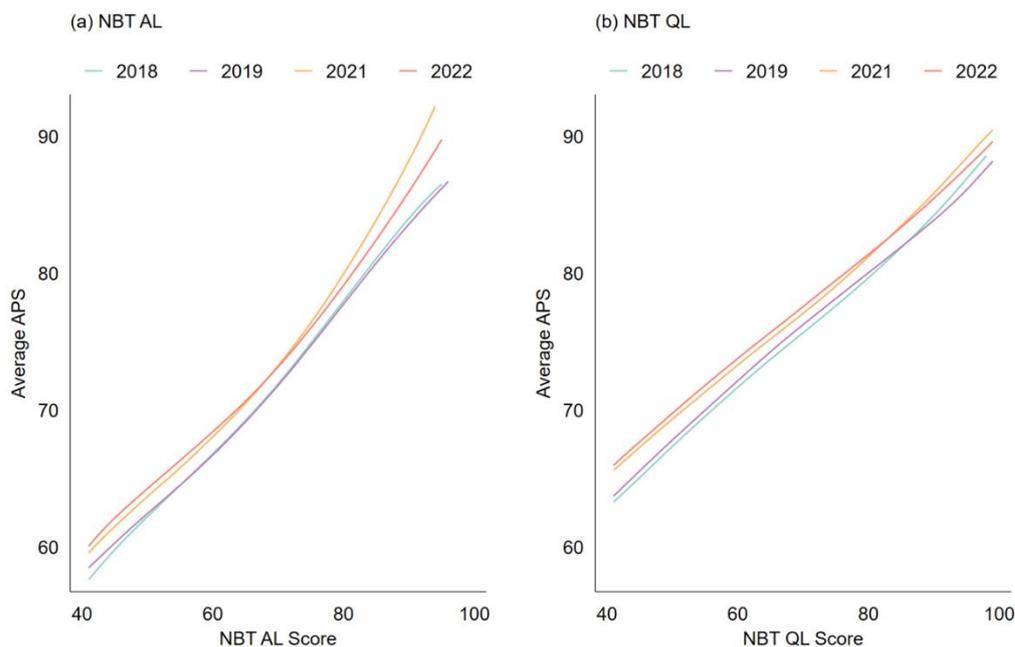
It is important to note that we cannot ascertain which NSC subjects may be driving the elevated APS averages in 2021 and 2022. We do not imply that all NSC subjects were affected in equivalent ways during the pandemic. APS changes are observed at an aggregated level, and it may thus be that different subjects and different students experienced varying adjustments, if any. It is also unclear the extent to which curriculum trimming may have interacted with NSC performance and therefore APS averages. While not necessarily likely, given existing evidence on learning losses, it is also possible real learning improvements occurred that were not detected in NBT performance.

Studies on learning losses have indicated that the pandemic was likely to have disproportionately impacted students facing financial and/or academic disadvantages (Ardington, Wills, and Kotze, 2021; Böhmer and Wills, 2023). Consequently, we explore whether observed improvements vary among applicants from different schooling backgrounds and at different points along the NBT distribution. Figure 4 shows average APS by NBT AL and QL quartile¹³, and whether an applicant attended a no-fee school.

¹² To check that changes in applicant demographics are not driving our findings, we hone in on applicants who receive admission offers, assuming fewer changes within this group. The results, shown in Figure A3 in the appendix, suggest that we might be underrepresenting the extent of potential inflation.

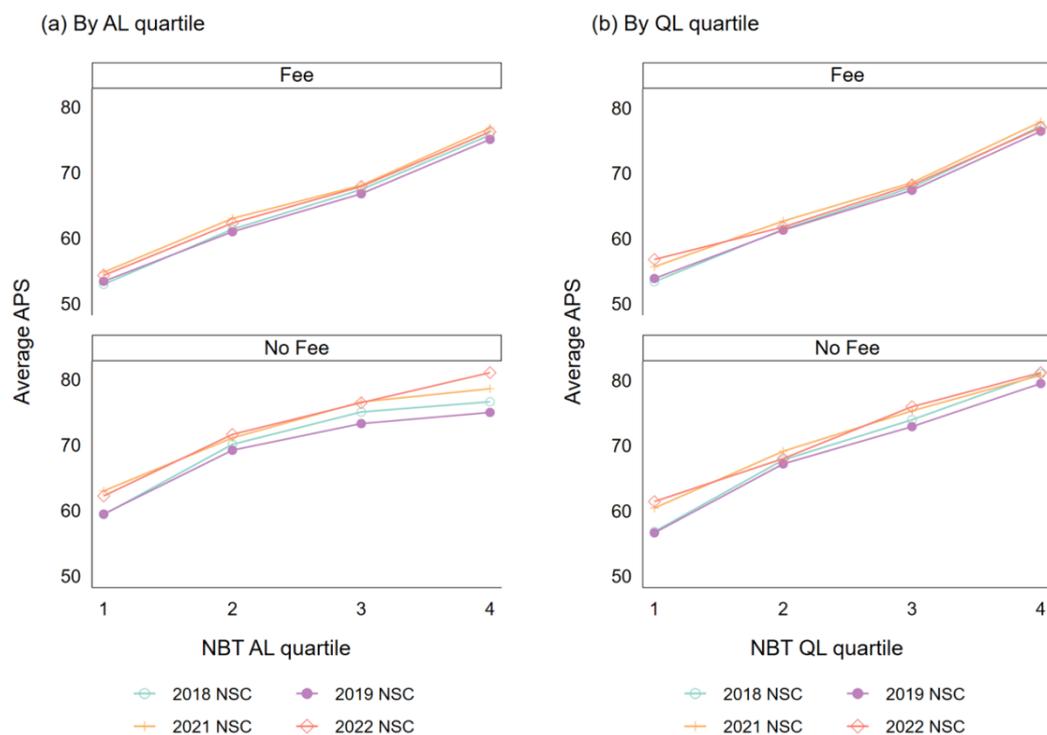
¹³ Students from both school types are grouped together when calculating quartiles.

Figure 3: Lowess smoothed plots of UCT applicants' average APS by AL and QL scores



Note: restricted to NBT scores > 40; sensitivity to outliers. Table A4 in the appendix shows mean APS by quartile. Sample is restricted to the applicant pool who wrote the DBE NSC the year prior to applying.

Figure 4: UCT applicants' average APS by NBT quartile and school type



Note: Sample is restricted to the applicant pool who wrote the DBE NSC the year prior to applying.

The data reveal that, within a given quartile, applicants from no-fee schools in 2021 and 2022 exhibited larger average APS gains, relative to NBT scores, compared to their counterparts from fee-charging schools. Figure 4 also consistently shows higher APS averages in 2021 or 2022 compared to 2018 or 2019 for those in the bottom quartile (quartile 1) of the NBT distributions, with this being most pronounced for applicants who attended no-fee schools.

APS averages among those in the top AL quartile (quartile 4) show notable fluctuations over time for applicants from no-fee schools. However, it is crucial to interpret these movements with the understanding that a very small percentage of applicants from no-fee schools fall into this quartile – roughly 2% of the top quartile comprises applicants from no-fee schools.

It is relevant to note that, even before the pandemic, applicants from no-fee schools achieved higher APS averages across AL and QL quartiles than those from fee-charging schools. This could occur if applicants from fee-charging schools are more likely to apply, regardless of performance. Put differently, among students from relatively more disadvantaged schooling backgrounds, it could be that only students who score highly choose to apply to UCT.

That said, if we expect that students at no-fee schools likely experienced the greatest disruption to their learning due to home/school circumstances, it is improbable that average APS improvements among this group, particularly at the bottom end of the NBT performance distribution, reflect genuine learning gains or occur purely as a result of changes in subject choices and combinations.

4.2 Movements in Mathematics

Some applicants also write a Mathematics NBT. In this section, we examine results of this NBT against the analogous NSC subject result – the NSC Mathematics.¹⁴ Mathematics performance presents an interesting case study for grade inflation, since progression typically requires building on foundational knowledge over time. Consequently, cumulative learning losses might be anticipated to hamper performance in both the NBT and NSC. Figure 5, shows the NBT and NSC Maths averages by NBT Maths quartile and school type.

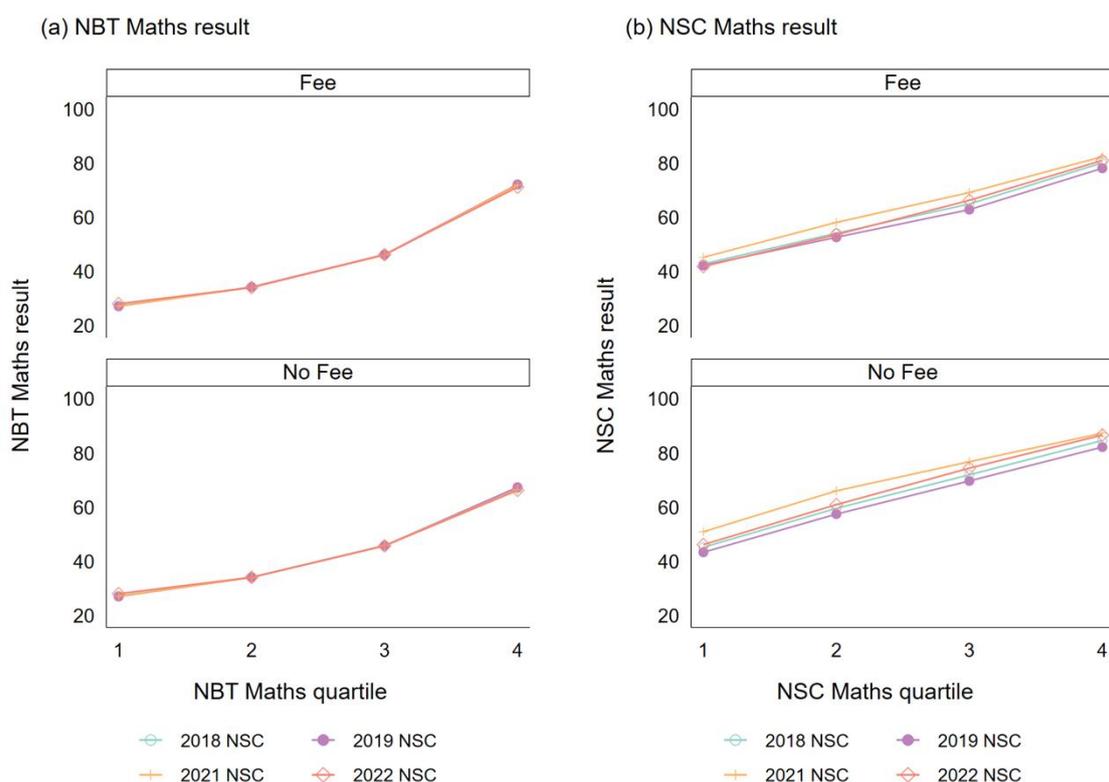
Panel (a) of Figure 5 shows that average NBT Maths performance has remained consistent among UCT applicants over the time period we study. We thus use NBT Maths quartiles to benchmark changes in the NSC. Panel (b) shows that although NSC Mathematics results have been rising prior to the pandemic, especially for applicants from no-fee schools, there was a more substantial increase in the NSC Maths results for the 2021 applicants from both fee-charging and no-fee schools. This aligns with a national-level spike in 2021 of students achieving at least 50% in Mathematics (Department of Basic Education, 2022).

¹⁴ See appendix Table A5 for sample characteristics of those with available data on the Maths NSC and NBT.

Maths scores declined somewhat again in 2022 but remained elevated relative to the NBT scores. This contrasts findings in the previous section, in which both the 2021 and 2022 groups' average APS remained elevated.

A return towards pre-pandemic levels among the 2022 NSC group may suggest either of two scenarios. First, the opportunity for the 2022 group to build foundational knowledge may have been disrupted by the arrival of COVID-19 at the beginning of their tenth grade. This could lead to lower grades compared to the 2021 group, for similar levels of NBT performance. Alternatively, the 2022 group may have had more time to 'catch up' before writing the NSC exams, thereby aligning their grade distribution more closely with those in pre-pandemic periods. In this case, the argument for potential inflation among the 2021 group is stronger, especially if they did not have the same opportunity to solidify grade 11 learning that may have been lost during lockdowns.

Figure 5: UCT applicants' Maths results by NBT Maths quartile and school type



Note: Sample is restricted to the applicant pool who wrote the DBE NSC the year prior to applying.

5 CONCLUDING REMARKS

In this study, we examine the association between NBT and NSC performance among students applying to UCT. It is important to recognise that although the NSC and NBT aim to measure different academic attributes, we would expect their relationship to remain consistent over time. We highlight three important findings.

First, the performance of UCT applicants in the NBTs does not appear to suggest any substantial differences over time regarding their readiness for university, except for slight declines in Quantitative Literacy performance. This allows us to use NBT quartiles to benchmark changes in NSC performance.

Second, applicants' APS averages, as derived from NSC results, have risen across the AL and QL distributions. Overall, this could either be indicative of grade inflation in the NSC following the pandemic, or other factors such as subject combinations changing over time and differently for various groups of students. Our analysis focusing on Mathematics only provides a somewhat more convincing indication of possible grade inflation in the 2021 NSC Mathematics results, but this reverted closer to pre-pandemic levels in 2022.

Third, our data indicate that gains were more prominent among relatively more disadvantaged applicants and those at the bottom of the performance distribution. This finding juxtaposes existing literature on learning losses, results which typically highlight setbacks among this group. It is, however, consistent with a grade inflation hypothesis.

The implications of the pandemic on students' learning remain to be felt as students progress through the higher education system and/or the labour market. It will therefore be important to continue to interrogate trends in the NSC results and how they relate to NBT performance. These comparisons, particularly at a subject level, provide an additional, independent tool that the system can use to monitor NSC qualification standards in addition to measuring the academic preparedness of applicants to higher education. As the subject choices and combinations thereof taken in the NSC change more this becomes increasingly important.

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6 APPENDIX

Table A1: NBT requirements by faculty at UCT

	AL NBT	QL NBT	Maths NBT
Commerce	Yes	Yes	Yes
Engineering & the Built Environment (EBE)	No	No	No
Humanities	Yes	Yes	No
Law	Yes	Yes	No
Health Sciences	Yes	Yes	Yes
Science	Yes	Yes	Yes

Source: [Undergraduate Prospectus 2023](#).

Table A2: Lower thresholds for proficient and intermediate benchmarks

		2015 thresholds		2019 thresholds	
		Degree	Diploma	Degree	Diploma
AL NBT	Proficient	68	61	69	61
	Intermediate	39	33	35	33
QL NBT	Proficient	70	66	70	66
	Intermediate	40	34	40	34
Maths NBT	Proficient	69	67	69	63
	Intermediate	35	38	37	33

Table A3: Mean characteristics of the full sample of UCT applicants

	NSC 2018	NSC 2019	NSC 2021	NSC 2022
Female	0.61	0.63	0.65	0.66
Age	19.89	19.87	19.92	19.91
APS average	64.28	64.24	63.63	64.21
APS missing	0.01	0.00	0.02	0.01
NBT AL result	58.09	57.38	57.84	56.90
NBT AL missing	0.13	0.12	0.37	0.31
NBT QL result	50.17	48.40	48.29	47.14
NBT QL missing	0.13	0.12	0.37	0.31
NBT Maths result	44.52	44.09	42.06	44.12
NBT Maths missing	0.28	0.27	0.51	0.45
Applied for financial aid	0.71	0.70	0.76	0.80
Applied for housing	0.80	0.80	0.81	0.82
School Quintile 1	0.04	0.05	0.06	0.06
School Quintile 2	0.08	0.07	0.09	0.09
School Quintile 3	0.14	0.14	0.16	0.15
School Quintile 4	0.13	0.13	0.14	0.13
School Quintile 5	0.46	0.47	0.42	0.44
No school quintile/private	0.15	0.14	0.14	0.14
Observations	19 773	19 994	30 479	29 869

Note: Sample restricted to South Africans applying for entrance the year following matric (DBE NSC only).

Table A4: UCT applicants' Average APS by NBT quartile

NSC cohort	NBT AL Quartile				NBT QL Quartile			
	1	2	3	4	1	2	3	4
2018	56.22	63.88	68.24	75.71	54.77	63.17	68.98	77.43
2019	56.52	63.37	67.53	75.02	54.96	63.00	68.43	76.63
2021	58.50	65.18	69.09	76.80	57.39	64.34	69.81	78.08
2022	58.13	65.19	68.94	76.31	58.52	63.63	69.71	77.27

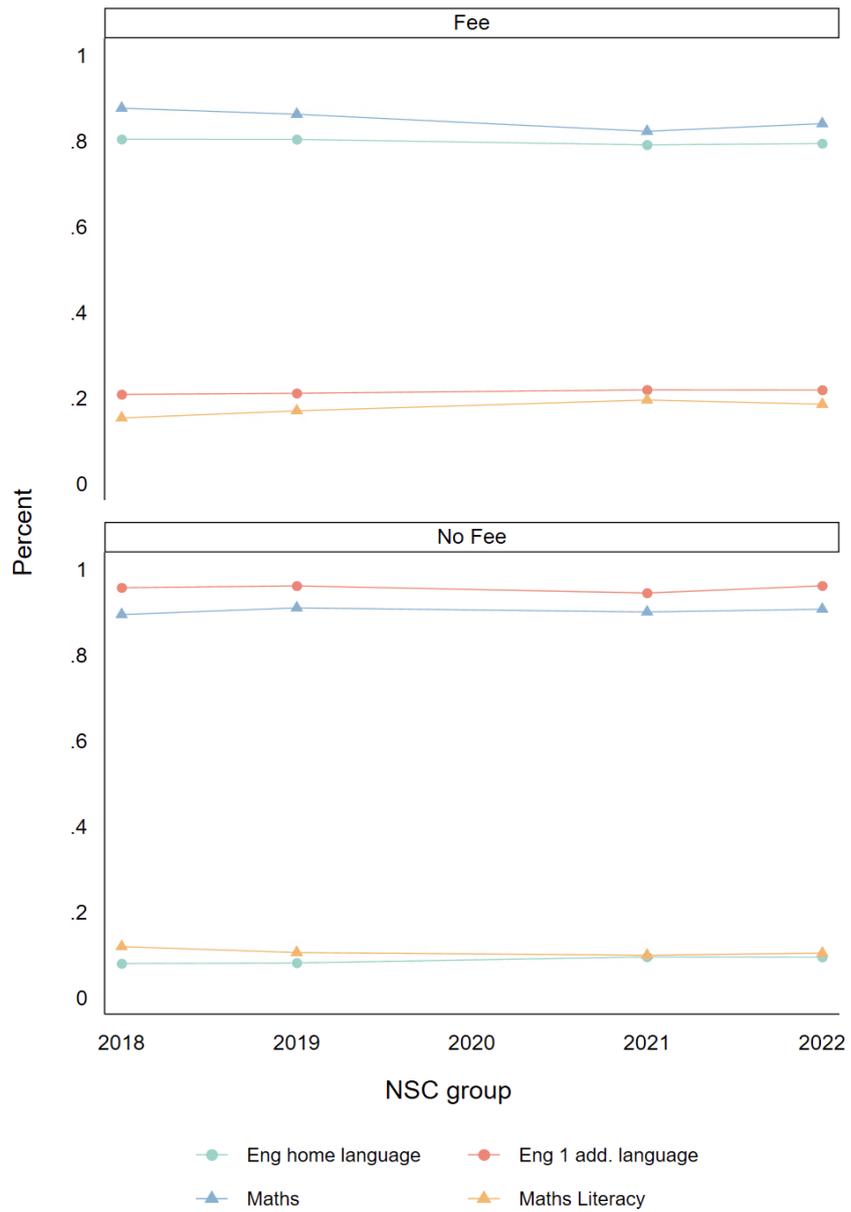
Note: Sample restricted to South Africans applying for entrance the year following matric (DBE NSC only), with available information on APS and NBT AL and QL scores.

Table A5: Mean characteristics, UCT applicants with available NSC and NBT Maths results

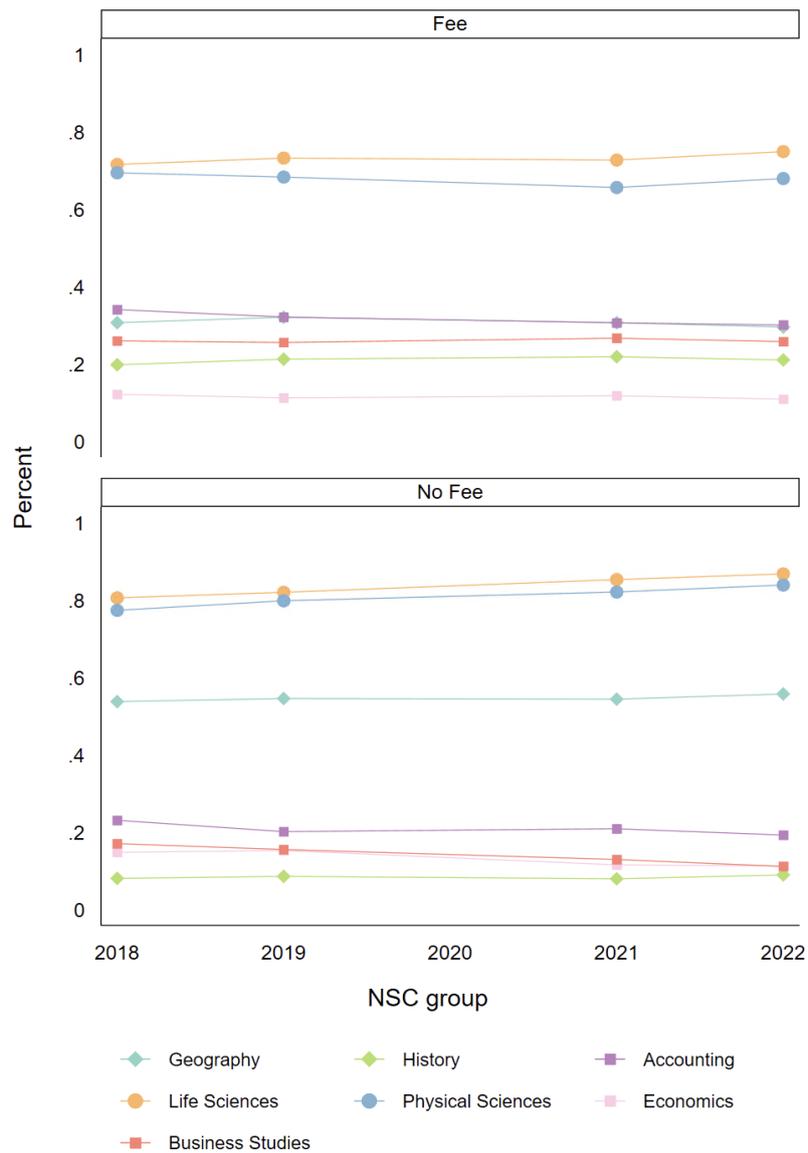
	NSC 2018	NSC 2019	NSC 2021	NSC 2022
Female	0.59	0.61	0.65	0.67
Age	19.82	19.81	19.82	19.82
NSC Maths result	61.49	59.51	63.12	62.36
NBT Maths result	44.80	44.37	42.44	44.42
Applied for financial aid	0.68	0.69	0.72	0.78
Applied for housing	0.80	0.80	0.79	0.81
School Quintile 1	0.04	0.05	0.05	0.05
School Quintile 2	0.07	0.07	0.07	0.08
School Quintile 3	0.13	0.14	0.13	0.14
School Quintile 4	0.13	0.12	0.13	0.13
School Quintile 5	0.48	0.48	0.48	0.46
No school quintile/private	0.15	0.14	0.14	0.15
Observations	14 000	14 310	14 537	16 253

Note: Sample restricted to South Africans applying for entrance the year following matric (DBE NSC only).

Figure A1: Share of applicants taking compulsory subjects, by school type

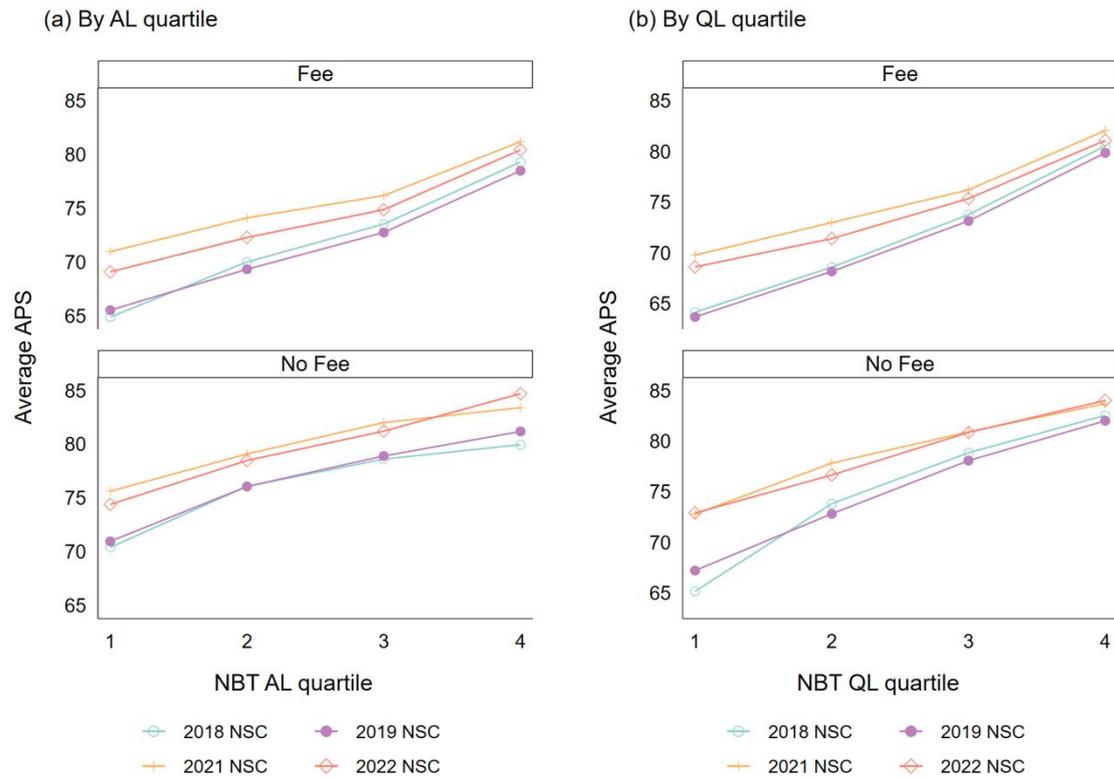


Note: Sample is restricted to the applicant pool who wrote the DBE NSC the year prior to applying.

Figure A2: Share of applicants taking elective subjects, by school type

Note: Sample is restricted to the applicant pool who wrote the DBE NSC the year prior to applying.

Figure A3: APS average by NBT AL and QL quartiles, applicants with offers only



Note: Sample is restricted to the applicant pool who wrote the DBE NSC the year prior to applying.

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