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NSC Achievement in South Africa: What Determines It, and Can The Changes Over Time Be Explained?

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Abstract

Despite the importance of the National Senior Certificate (NSC) Examination in South Africa, the determinants of NSC achievement and the reasons for its changes over time remain largely unexplored. This gap in understanding is especially pertinent in light of the record-breaking NSC pass rates achieved in recent years, despite greatly accelerated learner flows into Grade 12 (due to pandemic-related leniency). This paper investigates the factors associated with NSC achievement and explores how such associations may have varied over time. It also investigates how much of the change in NSC achievement across time can be explained by observable changes in cohort characteristics. National learner-level NSC data is used, with specific focus on the years 2011, 2019, 2021 and 2023. Analysis is conducted separately for candidates in Quintile 1 to 3 schools and Quintile 5 schools, and methodologies include Ordinary Least Squares (OLS), school Fixed Effects (FE) estimation, and Oaxaca-Blinder decomposition. 'NSC achievement' is defined to be candidates' average mark across their written subjects (excluding Life Orientation), while various learner and school characteristics—such as overage status, subject choice and candidates' relative academic ability—are included as potential determinants of NSC achievement. Approximately 50% of NSC achievement in individual years can be explained by the study's OLS models, driven by relative academic ability and, to a lesser extent, overage status and school quintile. A number of factors are shown to be associated with achievement, but associations vary too much to infer reliable relationships. Changes in age profiles and subject choice only partially account for changes in achievement over time, with a far larger share of changes being unexplained, potentially reflecting factors such as educational quality improvements. Counterintuitively, factors outside of the model improved for poorer schools during the pandemic, but deteriorated for Quintile 5 schools. The paper highlights the policy-relevance of determining the reasons for improved performance in the lower-repetition pandemic years, and its findings bring into question if South Africa's high repetition rates in Grades 10 and 11 are justified—a particularly relevant question, in light of recent evidence suggesting repetition rates are returning to their pre-pandemic levels,

Keywords: National Senior Certificate (NSC); School-exit examination; South Africa; COVID-19 effects

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[1] This working paper is adapted from a chapter of the same name which appears in the author's doctoral dissertation (Selkirk, 2025). Chapter three of the same dissertation is closely linked to this work, and provides additional background for the present paper. The author would like to thank the colleagues and examiners who provided feedback on earlier versions of this work and, in particular, Prof Servaas van der Berg and Dr Gabrielle Wills for their supervision and guidance on the entirety of this research.

1. Introduction

The National Senior Certificate (NSC) is an annual set of examinations written by South Africa's Grade 12 learners. In addition to its importance as a school-leaving certification system, the NSC is one of the country's few measures of educational outcomes at a secondary school level. Yet, despite the examinations' significance, relatively little is known about the determinants of NSC achievement and the reasons behind any improvements (or declines) in results over time. This is particularly true for the years following 2020, where NSC performance remained buoyant and even surpassed pre-pandemic levels by 2023—despite these NSC cohorts' exposure to the COVID-19 pandemic's schooling disruptions and large repetition-related compositional changes which would normally be associated with worse achievement (Selkirk & Wills, 2024; Selkirk, 2025: Chapter 3).

This paper investigates the determinants of NSC performance over time and explores how much of the changes in achievement can be explained by observable differences in NSC cohorts, particularly the shifts in age profiles related to grade repetition. This is done using anonymised national learner-level NSC data from 2008-2023, with specific focus on four time points: an early year in the NSC's history (2011); a year directly preceding the pandemic (2019); a year in the midst of the pandemic (2021); and a post-pandemic year (2023). To account for bimodal achievement distributions, the analysis was conducted separately for candidates in poorer (Quintile 1 to 3) and richer (Quintile 5) schools, which accounted for 80 to 85 percent of the country's full-time NSC candidates in each year. This study is the first of its kind in terms of scope and time horizon, and it is also one of few studies examining South Africa's educational outcomes at a secondary level during the pandemic.

Throughout the course of this paper, the following research questions are explored:

- What learner and school factors are associated with NSC achievement, and how have the associations changed over time?
- How have repetition changes affected the age composition of NSC cohorts, and how has the age composition influenced NSC results post-2019?
- How much of the change in NSC achievement over time can be explained by observable changes in cohort characteristics?
- What are the main drivers of the unexplained changes in NSC achievement over time?

The analysis incorporates a broad and holistic measure of NSC achievement by using learners' average marks across all their written subjects (excluding life orientation), which is similar to the Admission Point Score (APS) used by Whitelaw and Branson (2024). This avoids the methodological limitations associated with a binary outcome measure (such as NSC pass status) and also provides broader insights into NSC achievement than would be gained by analysis of achievement in a single subject.

Ordinary Least Squares (OLS) regressions were run on individual years to investigate the associations between NSC achievement and various school and learner characteristics, particularly learners' overage status. Learners' within-school standardized life orientation marks were used to control for unobserved factors such as learners' academic ability, socio-emotional skills, and language skills. Both the descriptive statistics in Section 3 and the OLS regression results in Section 4 show notable differences across years, therefore Oaxaca-Blinder decompositions were used to decompose the changes in performance between two years into an explained composition (endowment) effect and an unexplained (coefficient) effect.

Since many of the estimated coefficients vary across time and in different ways, it is difficult to make generalised statements that accurately summarize the results. However, a few notable patterns and findings do emerge. Firstly, the inclusion of candidates' relative life orientation achievement appears to be important, both in explanatory power and in reducing overestimation of the negative associations between overage status and NSC achievement. Secondly, the pro-female achievement gap that reflects in the descriptive NSC results from 2020-onwards is shown to disappear and instead reflect as a male advantage once factors such as overage status, subject choice and relative life orientation achievement (as proxy for academic ability) are controlled for. However, for learners in Quintile 5 schools, this result was sensitive to the inclusion of relative life orientation achievement and was also less stable across time, so it requires further investigation.

It was found that—despite large shifts in age profiles, and changes in the estimated negative coefficients on overage status during the pandemic years—the net contribution of age to the changes in NSC results across time was relatively minor. Such a finding calls into question the benefit of repetition in Grades 10 and 11, which is particularly relevant as repetition rates appear to be returning to their pre-pandemic levels (Van der Berg et al., 2024; 2025), which were high and in excess of 20 percent in each grade (DBE, 2023a).

Overall, the majority of the changes in NSC achievement over time could not be explained by the observed compositional changes, regardless of time period or school quintile under consideration. The contribution of individual factors to the overall unexplained (coefficient) effect varied across time and quintile group. In general, it was found that changes in the coefficients on subject and language choice, as well as changes in unobserved factors outside the model, accounted for the majority of the (unexplained) changes in NSC achievement over time.

A discussion is provided on potential reasons for the 'unexplained' components of the decomposition results. Some of the results have plausible explanations, such as improvements in factors outside of the model for both quintile groups between 2011 and 2023 reflecting education quality improvements that have been documented in the literature (Gustafsson & Taylor, 2022; DBE, 2023b; Gustafsson, 2017). Other results can be speculated upon—for example it is possible that the changes in subject choice coefficients may reflect varying standards within subjects over time (Gustafsson, 2016). But some results are simply perplexing, such as the counterintuitive finding that unobserved factors outside of the model improved during the pandemic period for candidates in Quintile 1 to 3 schools while simultaneously deteriorating for candidates in Quintile 5 schools. Further research is required to explain such results, and to confirm or disprove the speculated reasons behind changes in coefficients across NSC years.

This study does suffer from various limitations, some of which are already documented in existing NSC literature (discussed in Section 2). Additional limitations and contextual factors[2] are discussed throughout this paper and in Selkirk (2025, Chapter 3), and should provide valuable guidance and considerations for researchers working on NSC data in future. One of the primary challenges confronted during this research was obtaining causal results—ultimately, this study attained non-causal results that were robust across various models, and in many ways provided more questions than answers to the stated research questions. The final section of this paper provides recommendations on how the NSC data can be improved to allow for better quantitative research to be conducted on the upper end of the country's school system. Although such recommendations are discussed in the context of the NSC, they may be of use for countries with similar examination systems and data to South Africa.

The remainder of this paper proceeds as follows: Section 2 presents a discussion of the existing NSC research and relevant international studies, while Section 3 provides a descriptive overview of trends in the NSC over time and the variables used in the empirical analysis, as well as the methodology used in the analysis. The results and discussion thereof constitute Sections 4 and 5.

2. Background and Literature Review

2.1 Important considerations for studying NSC performance

There are various factors that complicate the analysis of NSC results. Gustafsson and Taylor (2017a) identify three factors which vary over time and make *prima facie* NSC results unreliable for studying trends: subject difficulty, subject choice, and learner flows into matric (Grade 12). Each of these factors will now be discussed in order to contextualize the NSC literature that follows later in this section.

Subject difficulty

The NSC is benchmarked to be comparable to international school-leaving qualifications (Umalusi, 2022a), but although every effort is taken to ensure the comparability of examination results across time[3], the NSC is primarily a certification system. The lack of common anchor items across years means that the standard of individual NSC subjects varies from year to year—a limitation mentioned by a number of studies (Gustafsson & Taylor, 2017a; 2017b; Zondo, et al., 2020; Gustafsson & Taylor, 2018; Gustafsson, 2016), and a problem which is not unique to South Africa's examination system (Coe, 2010).

The clearest illustration of varying subject difficulty in the NSC over time is given by Gustafsson (2016), who provides a balanced discussion of the topic and an analysis which includes the computation of an adjusted NSC mark for multiple subjects over the period 2008-2015. Gustafsson's paper focusses on the difficulty of achieving certain mark

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[2] Such as the much lower Grade 10 and 11 repetition rates during the COVID-19 pandemic, the influence of the Multiple Examination Opportunity (MEO) policy (and its removal) on the NSC, and other factors or policies affecting NSC cohorts over time. Selkirk (2025, Chapter 3) provides a more comprehensive discussion than is included in the current paper.

[3] Every year, Umalusi conducts a quality assurance process across every step of the NSC examinations—from moderating school-based assessment, monitoring the writing of the examinations and addressing any irregularities, standardizing and auditing the marking of the examinations, to qualitative and quantitative standardization of the final examination marks (Umalusi, 2022b).

thresholds[4] in various subjects each year, and conducts a mark adjustment by comparing mark distributions in a sample of stable schools to establish 'equivalent marks' across time. He shows that the use of adjusted marks eliminates counterintuitive racial patterns in NSC achievement, which is a good demonstration of how variable standards in NSC achievement may produce misleading results. Unfortunately, Gustafsson's (2016) analysis cannot provide generalisable mark adjustments, nor insights beyond 2015.

South Africa's NSC standardization process assumes that the academic ability distribution of NSC cohorts remains similar across years[5] (Wills, 2024), and its failure to incorporate compositional changes in NSC cohorts has previously been criticized in academic commentary (Spaull, 2016). The implication is that in years where large changes in the NSC population occurred—for instance, due to changes in repetition or dropout patterns—subject difficulty would likely fluctuate even more than normal. Whitelaw and Branson (2024) provide some recent evidence of this. Their study is a novel investigation of University of Cape Town (UCT) applicants' NSC performance during the pandemic, whereby NSC achievement is compared to achievement on the National Benchmark Tests[6] (NBTs). They find that applicants' 2021 NSC achievement rose relative to their achievement on the NBTs, particularly in mathematics, but also more for disadvantaged candidates and those at the bottom end of the performance distribution. The authors take this as a suggestion of possible grade inflation in the 2021 NSC, given that subject combinations changed minimally and the NSC-NBT relationship returned closer to pre-pandemic levels in 2022. Although their study is not nationally representative, their findings align with what might be expected at a national level if the 2021 standardization process failed to take into account the many additional 'pseudo-progressed'[7] learners who reached matric in 2021 through more lenient Grade 11 promotion standards at the end of 2020[8].

Learner flows into matric

Repetition and dropout patterns prior to matric don't only affect the standardization process—they also limit the ability to determine trends in achievement based on NSC results alone. For example, an improvement in the country's NSC results could reflect true educational improvement, but it could also represent higher 'weeding out' of academically weaker learners through repetition or dropout. This has been a more widely discussed limitation of NSC results, with the arising selection issues mentioned as early as 1998

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[4] For example, a mark of 60 percent, viewed as 'high achievement'.
[5] When determining if raw NSC marks should be adjusted upward or downward, the statistical side of the quality assurance process (footnote 3) involves comparing the raw mark distribution to a rolling three- to five-year average mark distribution. Inherent to this process is the underlying assumption that there are negligible differences in the academic ability distribution of NSC cohorts across years (Umalusi, 2014; Wills, 2024).
[6] The NBTs are a complementary assessment (to the NSC) and are used by some higher education institutions in their admissions (Whitelaw & Branson, 2024).
[7] 'Pseudo-progressed' learners refers to learners who normally would have failed Grade 11, but were instead able to meet the more lenient Grade 11 promotion requirements which applied during the pandemic. Such learners were essentially 'progressed' (i.e. promoted to Grade 12 despite not meeting the Grade 11 promotion requirements) without being officially classified as 'progressed learners'—hence 'pseudo-progressed'.
[8] The 'pseudo-progressed' learners would be disproportionately found at the lower end of the performance distribution (see Chapter 3 of Selkirk (2025)) and in lower-SES schools (due to their higher pre-pandemic repetition rates). Such learners may have had their marks (erroneously) adjusted upward in order to fit the 2021 NSC achievement distribution to the previous years' mark distributions (which were based on academically stronger learners).

(Crouch & Mabogoane, 1998) and being included in annual NSC examination results reports as 'throughput rates' from Grade 10 to 12 (for example, DBE (2023b))—likely due to increased public scrutiny of survival rates to matric (for example, Steinsland (2020)).

The differing size and academic ability of the annual matric population has been an insurmountable limitation for some studies, with some researchers opting to extrapolate results to matric rather than utilise actual NSC achievement (for example Spaull & Kotze, 2015). Other studies have attempted to address these selection issues by methods such as incorporating prior grades' enrolment numbers (Gustafsson & Taylor, 2017a; 2017b; Gustafsson & Taylor, 2018) or age demographics (Gustafsson & Taylor, 2017b), usually at a Grade 10 or 15-year-old level. But these attempts still suffer from data limitations and unstable Grade 10 repetition rates.

Subject choice

An important compositional element that is not visible in most reported NSC statistics—and not necessarily captured in changes in learner flows—is subject choice. The role of subject choice in NSC performance has been touched on in various studies. This has ranged from mention of the risk of schools manipulating their results by "*changing the subject choices of learners in undesirable ways*" if undue emphasis is placed on schools' Grade 12 passes (Gustafsson & Taylor, 2017a:25), to cautions that upward trends in the NSC qualifications could be attributable to changed subject combinations rather than improved school quality (Gustafsson & Taylor, 2017b:12).

The above statements assume that there are varying difficulty levels across NSC subjects within the same year, and that this affects candidates' prospects of passing or performing well on the NSC. Most research into subject choice has focussed on the choice between mathematics and mathematical literacy, since all learners on the academic pathway are required to take one of these two subjects (DBE, 2012). Mathematical literacy is undisputedly the easier of the two subjects, and studies involving 'equivalence scores' have demonstrated that learners' achievement in mathematical literacy is 20 to 30 percent higher than would be expected for mathematics achievement (Simkins, 2010; Shepherd, 2012; Bridgman, 2020; Swelindawo & Taylor, forthcoming). Van der Berg et al. (2023) showed that a third of candidates failing the NSC in 2021 failed mathematics, indicating that subject choice may indeed be a barrier to learners' NSC success[9]. A more recent report (Van der Berg et al., 2025) also showed that learners who choose mathematics instead of mathematical literacy in Grade 10 are less likely to reach and pass the NSC on-track if they enter Grade 10 with an inadequate mathematics foundation.

Choice of compulsory home language examination has also been found to play a role in NSC achievement. Moodley and Coetser (2023) conducted a comparative study of four South African NSC home language examinations' poetry sections and found that the level of question difficulty varied by language. They found a tendency towards easier questions in Afrikaans and isiZulu home language and primarily low-difficulty questions in Sesotho

[9] Previously, Simkins (2010) also highlighted potential subject mismatch in the 2008 NSC examinations. Although he didn't explicitly relate it to NSC passes, he identified large numbers of candidates who failed mathematics but likely would have passed mathematical literacy (and also candidates who took mathematical literacy but could likely have passed mathematics with 50 percent).

home language, compared to a wider distribution of question difficulty levels in English home language.

Taken together, the aforementioned studies imply that shifts in subject choice[10] could increase NSC achievement—and potentially NSC pass rates too—without indicating improvements in educational quality, as cautioned by Gustafsson and Taylor (2017a; 2017b). Although the studies touch on just a few of the more than one hundred unique subjects offered under the NSC, it is not unreasonable to assume that differing subject difficulty is present among other non-compulsory subjects. Unfortunately, it is difficult to establish the relative difficulty of subjects, because average achievement or 'popularity' of subjects may be misleading[11]. While schools might manipulate their NSC pass rates by restricting subject offering or guiding candidates into 'easier' subjects, it is also possible that changing subject choice patterns may reflect changes in student or parental preferences. It should also be noted that—while subject choice may be used disingenuously to influence NSC achievement and produce artificial 'gains'—shifts in subject choice may represent positive educational changes, such as better matching of learners to appropriate subjects[12].

Other considerations

Aside from the three factors[13] that have already been discussed, there two further considerations that are relevant to NSC research. While not a concern for the present study, it has been noted that school-level analysis of NSC achievement indicators—such as the percentage of candidates reaching specific mark thresholds—is often hindered by floor and ceiling effects (Gustafsson & Taylor, 2017b; Selkirk, 2025: Chapter 3). Another limitation, which is present in the current study and also in most other studies, is that only full-time NSC candidates are considered in the analysis. A number of South African youth obtain the NSC as part-time candidates or through supplementary examinations, but there is a lack of reporting on these candidates and their results are not included in most NSC datasets used by researchers (Gustafsson & Taylor, 2017a; Gustafsson, 2019). Therefore, standalone NSC results underreport real school completion in South Africa, and inferences about the overall success of the South African education system should be mindful of this fact[14].

The NSC examination is one of the only ways to gain insight into educational performance in the final years of South Africa's schooling, given the dearth of standardized testing data at secondary school level. But all of the aforementioned limitations, combined with scarce

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[10] From mathematics to mathematical literacy, or from more challenging to easier home language subjects.

[11] High average achievement in a subject could indicate an 'easy' subject, but it could also indicate a difficult subject that is only chosen by high-ability candidates (who perform well, due to their ability). Similarly, high enrolment in a subject could indicate an easy subject which is seen as a route to better performance on the NSC, but it could alternatively indicate a difficult subject that is deemed necessary to improve future career prospects.

[12] 'Appropriate subjects' here refers to two meanings: (1) subjects that more appropriately match the demands of the labour market, and (2) subjects that better match learner ability. In the second instance, it is arguably better for a learner to achieve an NSC pass with mathematical literacy than to fail the NSC with mathematics—although this is a long-debated and contentious topic (see Clark (2012), for an example of public discourse).

[13] Subject difficulty, learner flows, and subject choice.

[14] According to Gustafsson (2019) and DBE (2024a), approximately 39,000 additional NSC passes per year were obtained than was officially reported during the 2014 to 2017 period. This was due to the existence of part-time candidates or full-time candidates repeating some subjects.

access for researchers to national learner-level NSC data, mean that the determinants of NSC performance is not a widely studied topic. Much of the existing literature is dated or not nationally representative, but nevertheless, a discussion of some of the available literature will now be presented.

2.2 Studies on NSC achievement

One of the earliest studies of NSC performance took place prior to the 2008 redesign of the matric certification system from the Senior Certificate (SC) to the National Senior Certificate (NSC). The study by Crouch and Mabogoane (1998) was part of a project identifying high performing schools. Using stepwise regression, the authors found that failure to take measures of advantage (such as candidates' home residence type) and resources (such as learner-educator ratios) into account heavily skewed the ranking of top schools toward those with better resources and more advantaged learners, with each component contributing approximately 25 percent to SC achievement. Although the schools in their sample were neither a random sample nor nationally representative, their findings align with the widely accepted view in both the South African and international education literature that school and learner socioeconomic status (SES) are strongly associated with achievement (for example, Van der Berg (2006); Spaull and Kotze (2015); Hanushek et al. (2022)).

In NSC literature, the focus is more commonly on school SES (namely, school quintile), since NSC data does not directly include learner SES variables. School quintile itself is particularly relevant in the South African education system given the bimodal nature of South Africa's achievement distribution (see, for example, Spaull (2012)). Since Crouch and Mabogoane's (1998) study, other studies have examined the relationship between school wealth and NSC achievement and have demonstrated significant differences across quintiles.

Shepherd's (2012) analysis of national 2008-2010 NSC mathematics results found a consistent SES-gradient across Quintile 1 to 4 schools and large jump in the performance of Quintile 5 schools compared to the other quintiles. The analysis also incorporated schools' historical homeland classification, and persistent negative effects were found for former homeland schools in Quintile 5—although Shepherd said selection effects could not be ruled out as a possible explanation. Quantile regression analysis of the Western Cape's NSC mathematics performance over the period 2009 to 2014 also found significant school quintile effects, but decreasing inequality in performance over the period (Zondo et al., 2020). Another paper by the same authors found that quintile effects in the 2009 Western Cape NSC mathematics examination extended beyond aggregate achievement, as their item-level graded response model (GRM) showed that question difficulty and item discrimination power varied across quintiles. Specifically, better item discrimination was shown to exist in Quintile 5 schools (Zondo et al., 2021).

In addition to school quintile, studies of NSC achievement have also investigated geographic factors. Zondo et al. (2020) found education district to be associated with the Western Cape's NSC results, while provincial variation in achievement has been noted in various studies at NSC level and also in earlier grades (Shepherd, 2012; Gustafsson & Taylor, 2022; Gustafsson, 2016). It is possible that provincial variation reflects province-specific marking anomalies, or socioeconomic status differences that are not captured by school quintile. But an alternative explanation is that geographic factors serve as proxies for administrative capacity and functionality. This was investigated by Gustafsson and Taylor (2018) in a quasi-experimental study where they exploited a municipal-driven redrawing of provincial boundaries to determine the impact of better school administration practices on NSC results. They found convincing evidence that schools being reallocated to a province with better administration practices experienced improvements in NSC results which increased over time, which the authors attributed mainly to better accountability, curriculum support, and learning support material prioritisation under the 'better' provincial administration.

2.3 Learner characteristics and selection effects

Much of the aforementioned literature conducted analysis at a school level, and therefore limited insight can be gained regarding the role of learner characteristics such as gender and age in NSC achievement. There is similarly little guidance given on how to deal with selection effects into matric, or subject choice, both of which are particularly relevant to the present study in light of the large repetition and compositional changes which affected NSC cohorts during the COVID-19 pandemic years (see Selkirk & Wills, 2024; Selkirk, 2025: Chapter 3).

Some insight is provided, albeit at school level, by Gustafsson and Taylor's (2018) analysis, which showed that omission of selection effects—that is, failing to take into account learner flows and subject choice—resulted in a meaningful change in estimated coefficients[15]. At a school level, the authors also used factors such as the proportion of candidates that was female, the proportion that was black, and the average age of NSC candidates to verify that their sample did not change meaningfully across time. From this, it can be inferred that these factors are either directly associated with NSC achievement or are proxying for selection effects into matric.

International literature provides little insight into what learner characteristics are associated with achievement on school exit examinations. Much of the literature tends to be context-specific, with a focus on examinations' impacts on pre- and post-examination outcomes such as dropout, subject choice, and post-school success (see an overview in Poquette and Butler (2018)). The scarcity of research into what determines achievement at this level may be because it is deemed better to rather investigate the determinants of achievement in earlier grades where there is still time to intervene and improve learners' educational trajectories. It also may be because many examinations suffer from standardization issues (Coe, 2010), which makes analysis of achievement over time difficult.

[15] To account for learner flows and subject choice, the authors assigned a mathematics mark of zero to all learners who did not reach matric (based on Grade 10 enrolment two years prior) and also to learners who reached matric, but did not take mathematics. Including these zeros in each school's achievement distribution, they then took the 95th-percentile of mathematics achievement for each school and used it as one of their NSC outcome measures. Full details of this method and its limitations can be found in their earlier working paper (Gustafsson & Taylor, 2016:11), along with other outcome measures they constructed for comparative purposes.

The international literature does provide a good example of how school exit examinations data can be used to investigate changes in educational outcomes over time when selection effects are present. Alvarado et al. (2023) used Columbia's school leaving (Saber11) examination data to determine the pandemic's effects on educational achievement. They employed school and time fixed effects in their model, using both overall scores and subject-specific scores as outcome variables, and various school and individual characteristics as explanatory variables. They also used inverse probability weighting to account for selection bias into the 2020 examination, since the examination was written by fewer learners than in previous years. But while this study was the closest that could be found to parallel South Africa's NSC contextual factors, there are key aspects in which the Colombian context differs, which makes equally rigorous investigation of South Africa's data impossible.

The Saber11 examination uses methods based on item response theory (IRT) to equate test difficulty across years (Alvarado et al., 2023), so the Colombian standardization process is more rigorous than the NSC's, which may have varying standards across years (as previously discussed). In addition, the Saber11 data includes rich data on individual learners, with information such as socioeconomic status, parental education and occupation, and technological access. Such variables served as valuable controls in Alvarado et al.'s (2023) analysis, but they furthermore allowed the authors to use inverse probability weighting to account for selection bias. In the current NSC data, not enough learner variables are available to plausibly identify the additional (or missing) NSC candidates, which is a limitation that will be discussed further in the concluding section. Therefore, while Alvarado et al.'s (2023) paper would normally provide valuable methodological insight for the present analysis, the nature of the NSC data limits the insight that can be gained from this (and other) international studies.

As has been demonstrated in this section, the analysis of NSC results is not without challenges, and literature gives little guidance on best practices for analysing NSC achievement. Nevertheless, valuable insights can be gained from working on the NSC data descriptively[16], and quantitative analysis—even if imperfect—can provide guidance for future studies and identify areas in which the data needs to be improved. The next section explores the NSC data and provides descriptive statistics for the NSC across time. It also explains how the variables used in the study were selected or constructed to best address the challenges that have been raised in the literature, before discussing the methodology that was used to obtain the results presented in Section 4.

3. Data and methodology

3.1 Data

This study uses a learner-level NSC dataset containing approximately 9.2 million full-time candidates for the period 2008-2023. This dataset was constructed from a larger learner-level NSC dataset obtained with permission from the Department of Basic Education

[16] Provided that the aforementioned considerations are kept in mind, descriptive analysis can begin to uncover potential relationships or interactions that exist and might warrant further investigation.

(DBE), which was received with all personally identifiable information already anonymised. The construction process—along with the classification of 'full-time candidates', henceforth referred to as 'candidates'—is described in Appendix A.

This section gives a descriptive overview of the variables used in the study and also presents the trends over time and across quintiles. Although the empirical analysis in Section 4 is limited to candidates in Quintile 1 to 3 and Quintile 5 schools in four specified years, the statistics presented in this section are not limited to that subsample unless explicitly stated.

Choice of years and quintile groupings

With such a large dataset and time period, it is necessary to focus the analysis (and descriptives) on fewer central time points. The year 2011 was chosen as the earliest year in order to allow for stabilisation of NSC results following the introduction of the new national curriculum statement that was first written by the 2008 NSC cohort. The year 2019 was used as a pre-pandemic reference point, while 2021 reflects the year in which there was a substantial increase in NSC enrolment following the Grade 11 repetition changes[17]. Finally, 2023 was chosen to represent both a 'post-pandemic' NSC year and the most recent NSC data year at the time of writing.

As mentioned in Section 2.2, South Africa has a bimodal achievement distribution. This often motivates for separate consideration of quintile groups during analysis, with the usual separation being between Quintile 1 to 4 schools and Quintile 5/independent schools. Exploratory analysis of the present NSC data suggested that data generation processes for candidates in Quintile 4 schools and candidates in schools with independent or missing quintile status were dissimilar to other quintile groups[18]. For this reason, it was decided to use only the 'Quintile 1 to 3' and 'Quintile 5' quintile groupings for this study's empirical analysis. This did not substantially alter the sample's national representativity, since candidates in Quintile 1 to 3 and Quintile 5 schools still accounted for 80 to 85 percent of national NSC candidates in each year.

Achievement outcome measure

Rather than using marks for a single subject or a binary outcome measure such as NSC pass or bachelor pass status, a broader measure of achievement was constructed by computing the average mark across each candidate's non-life orientation subjects. This measure is referred to as 'average mark' in the remainder of this paper, and it is somewhat similar to the UCT Admission Point Score (APS) used in Whitelaw and Branson (2024)[19]. Subjects not examined by the DBE or with no recorded mark (after the cleaning process described in Appendix A) were excluded from the average mark computation.

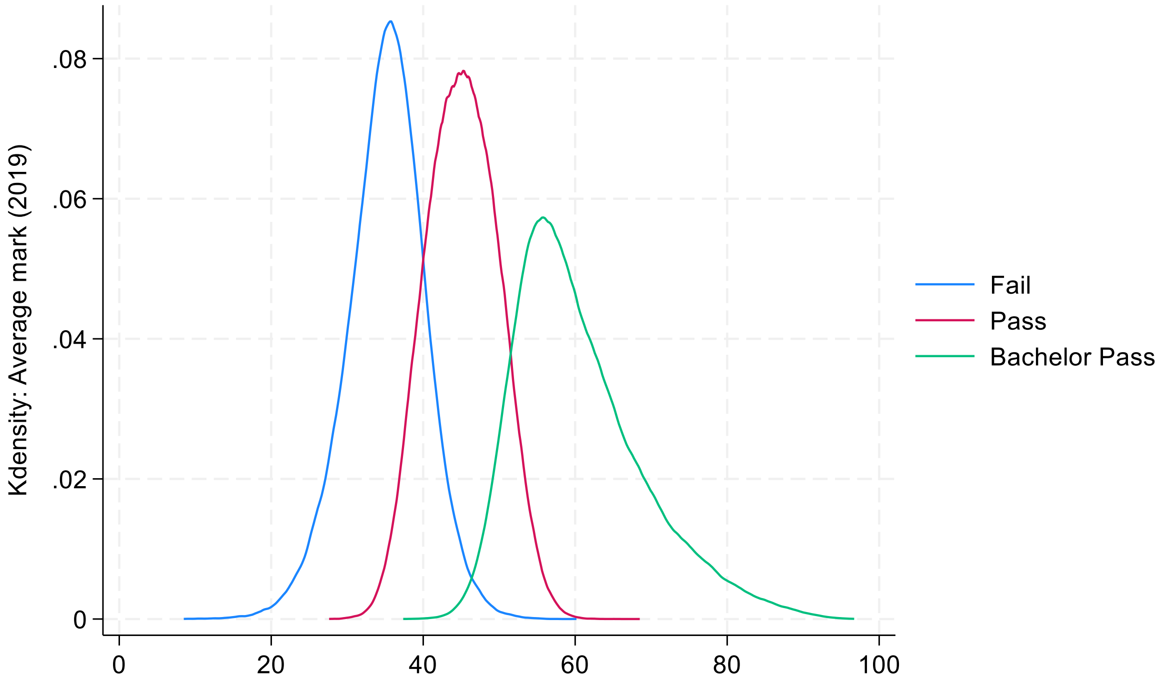
[17] See Figure 1 in Selkirk (2025) and the discussion in Chapter 3 (ibid.) for the repetition changes that happened at the end of 2020. Specifically, national Grade 11 repetition rates more than halved at the end of 2020 (dropping from 24 to 11 percent (DBE, 2023a)). This had clear impacts on the number (and characteristics) of candidates reaching and writing the NSC examinations in 2021.

[18] These differences were largely driven by subject choice and language examination choices.

[19] The key difference is that 'average mark', does not restrict the number of subjects included in the average to be five subjects in addition to English, which is what is done in the APS calculation (according to Whitelaw and Branson (2024)).

Candidates' average marks fall on a scale between 0 and 100, thus providing more discriminatory power than a binary outcome measure. The averaging of marks across subjects also potentially limits the influence of year-specific standardization anomalies in individual subjects. Overall, the computed average marks align well with NSC pass outcomes, as Figure 1 illustrates using 2019 as an example year. For the remainder of the paper, the terms 'achievement', 'average mark' and 'average NSC mark' shall be used interchangeably.

Figure 1: Distribution of average mark by NSC pass outcomes (2019)



Source: Own calculations using NSC 2008-2023 data. Only full-time candidates are included, and candidates' average mark calculation excludes life orientation and subjects missing marks or not examined by the DBE. Distributions overlap because pass status is dependent on reaching various minimum mark thresholds, not aggregate achievement (see Selkirk and Wills (2024:10) for a summary of pass requirements).

Over time, average marks for the entire NSC cohort have been steadily increasing, rising from an average of 42.84 in 2008 to 50.11 in 2023. However, not all quintiles experienced identical increases. Table 1 provides the mean of the average marks and also the achievement quartiles for selected years and quintile groups, which shows that gains in achievement were driven by improvements in Quintile 1 to 3 schools. Despite improvements in achievement for candidates in Quintile 5 schools between 2019 and 2021, the overall trend for candidates in these schools was declining achievement.

The increases in mean average marks of Quintile 1 to 3 candidates were experienced across the entire achievement distribution, reflected by gains at both the 25th and 75th percentiles. This increase resulted in a large overall decrease in the achievement gap between Quintile 1 to 3 and Quintile 5 schools. Differential pandemic- or repetition-related impacts across quintiles are also suggested by the changes in average marks: while achievement declined slightly between 2019 and 2021 for candidates in Quintile 1 to 3 schools—especially those at the lower end of the achievement distribution—achievement for candidates in Quintile 5 schools improved at both the median and 75th percentile. This would suggest that Quintile 1 to 3 schools had more academically weaker candidates in 2021 and may have experienced negative pandemic effects, while Quintile 5 schools were mostly unaffected by these changes and may have even benefitted from any standardization anomalies.

Table 1: Summary statistics of average mark across subjects by quintile group

	Mean	p25	Median	p75	n
Quintile 1-3:					
2011	42.74	35.67	41.83	48.67	323,315
2019	46.93	39.67	46.00	53.33	320,872
2021	46.37	38.00	45.50	53.83	490,423
2023	49.09	40.83	48.17	56.50	469,113
Quintile 5:					
2011	56.98	47.83	56.17	65.33	77,895
2019	54.86	45.57	53.67	63.00	95,732
2021	55.31	45.50	54.33	64.17	106,190
2023	54.29	44.67	53.17	63.00	107,120
All quintiles:					
2011	46.00	37.50	44.33	52.83	496,047
2019	48.97	40.83	47.67	55.83	504,269
2021	48.29	39.33	47.17	56.17	703,923
2023	50.11	41.50	49.00	57.83	691,147

Source: Own calculations using anonymised NSC 2008-2023 data. Only full-time candidates are included, and candidates' average mark calculation excludes life orientation and subjects not examined by the DBE. 'All quintiles' includes candidates in Quintile 4 and independent schools. Candidate numbers are shown in the rightmost column.

However, as cautioned in Section 2, improvements in average marks do not necessarily indicate improvements in true NSC achievement. The following sub-sections will discuss some of the compositional changes that may have impacted performance (and inequality) across time, and the probable associations between these variables and average NSC marks will also be discussed.

Age

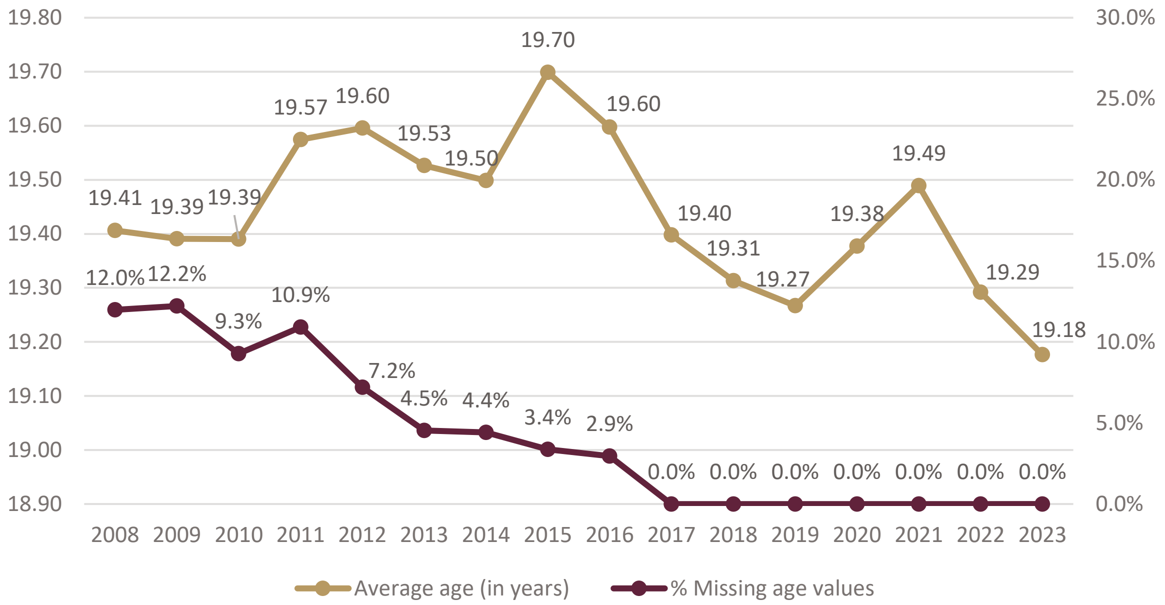
In light of large changes in repetition patterns over time[20] and the mostly-unstudied influence of such changes on the NSC results, overage status—a proxy for prior repetition—is of particular interest in this study. The NSC data provides candidates' age (rounded down to the nearest month) in November of the year they write the NSC, and this was used to calculate age at year-end. Candidates were then assigned an overage status ranging from '0 years overage' (candidates younger than 19 at year-end) to '3+ years overage' (candidates 21 or older at year-end).

Overage status thereby proxies for repetition throughout candidates' entire schooling careers, with appropriately aged candidates deemed never to have repeated, and '3+ years overage' candidates assumed to have repeated three or more grades prior to reaching

[20] See Selkirk (2025, Chapters 1 & 3) for a discussion of South Africa's repetition patterns and their changes over time. DBE (2023a) and Van der Berg et al. (2024; 2025) show the large declines in repetition during the pandemic years (also refer to footnote 17) and the gradual return to pre-pandemic repetition rates observed since.

matric[21]. Age data prior to 2016 was incomplete—ranging from approximately 12 percent missing age data in 2008 to three percent missing age data in 2016—but near fully complete thereafter (see Figure 2).

Figure 2: Average age of full-time NSC candidates and percentage of incomplete age data



Source: Own calculations using anonymised NSC 2008-2023 data. Age refers to candidates' age at the end of the year in which they write the NSC, rounded down to the nearest month.

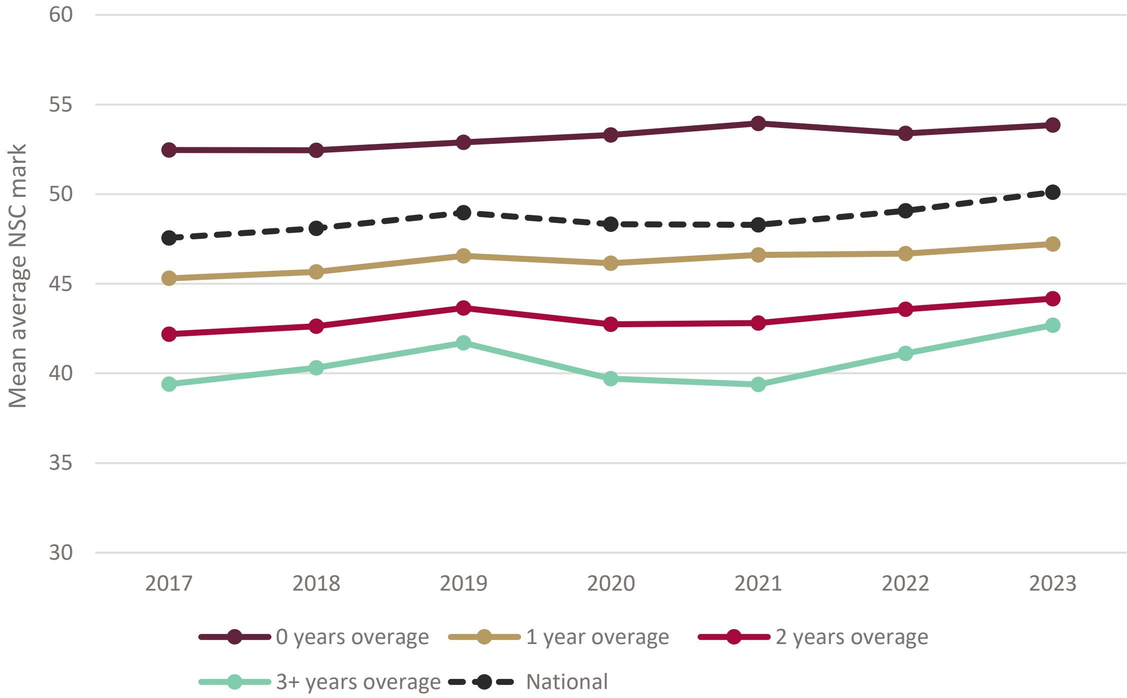
The age patterns reflected in Figure 2 clearly demonstrate the influence of FET phase repetition and progression policies over time. NSC candidates' average age peaked at 19.7 years in 2015 when progression policy allowed more learners to reach matric without meeting Grade 11 promotion requirements. In contrast, a local minimum of 19.27 years was reached in 2019 when academically weaker learners opted into the Multiple Examination Opportunity (MEO) and were not included in the full-time candidate statistics. Post-2019, it appears that the removal of the MEO increased the average age in 2020, before accelerated flows at the end of 2020 caused an even higher average age in 2021. Meanwhile, the lower average ages in 2022 and 2023 suggest that the bottleneck of overage learners in the FET phase was alleviated through the accelerated pandemic flows, with the result being that the 2023 NSC cohort's average age of 19.18 years was the youngest on record.

The preceding discussion relies on the premise that older learners are academically weaker than their peers. Given repetition's association with academic ability, this is not an unreasonable assumption to make. It is also visible in NSC achievement—see Figure 3, which depicts average NSC achievement by overage status for the 2017-2023 period. Younger candidates have consistently outperformed older candidates, and it can also be

[21] Month of birth may affect the appropriate year of school entry, so assuming that all learners who are 'three or more years overage' have repeated three or more grades may be an oversimplification. However, this assumption is consistent with existing practices (for example, Van der Berg et al. (2021)), and knowledge of how age of entry practices differ by province and quintile (Böhmer, forthcoming) is still emerging at the time of writing this paper.

seen that the achievement gap between appropriately-aged candidates and 'multiple repeaters' (candidates two or more years overage) grew in 2020 and 2021, but narrowed substantially in 2022 and 2023, particularly for the oldest candidates.

Figure 3: Mean average NSC mark by overage status (National)



Source: Own calculations using anonymised NSC 2008-2023 data. '0 years overage' refers to candidates turning 18 or younger in the year in which they wrote the NSC, and 'average NSC mark' excludes candidates' life orientation marks and subjects not examined by the DBE.

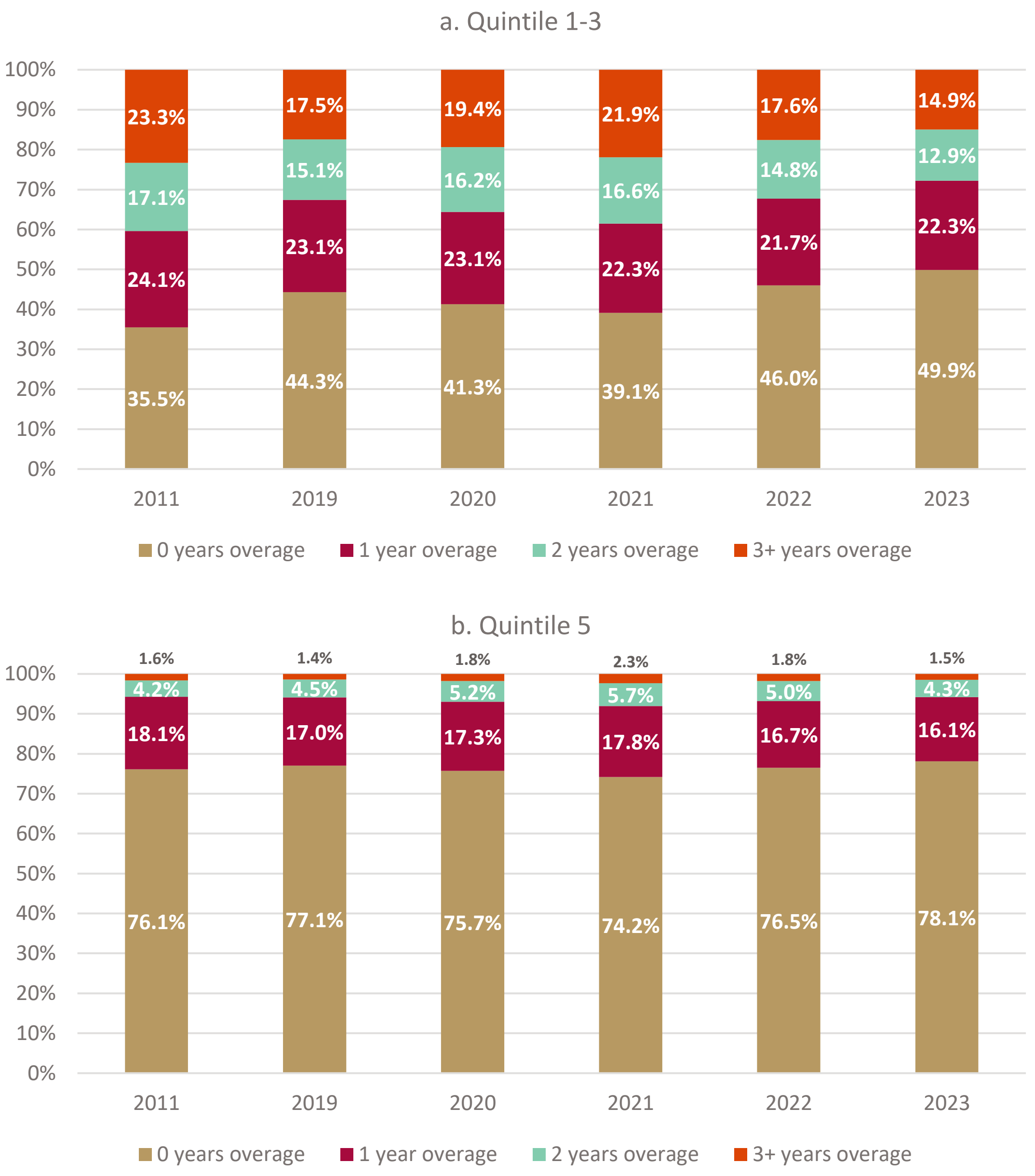
To examine age patterns at a more disaggregated level, Figure 4 shows the percentage of NSC candidates that fell within each overage category over the past five years—by quintile group, and with 2011 as a comparative earlier year. In all years, there was a striking difference between quintiles: in the richest schools, more than three quarters of candidates were the correct age-for-grade, compared to less than half of candidates in the poorest three quintiles, and there were far fewer instances of multiple repetition. In addition, while the Quintile 5 age distribution hardly changed over time, the age profile of Quintile 1 to 3 candidates improved substantially, with the proportion of appropriately aged candidates rising from 35.5 percent to almost 50 percent between 2011 and 2023.

The disaggregation of the NSC cohort by overage status (Figure 4) also makes it possible to examine the prevalence of multiple repetition[22] in Quintile 1 to 3 schools. In 2011, more than 40 percent of candidates were two or more years overage, and this number may even be underestimated due to the incomplete age data in this year[23]. By 2019—through policy-driven efforts to reduce repetition, and perhaps also through older learners opting into the MEO—the percentage of candidates two or more years overage in Quintile 1 to 3 schools had decreased to approximately 32 percent. The removal of the MEO and accelerated

[22] Candidates two or more years overage, therefore the top two segments of the bars in Figure 4.
[23] In general, missing data is more prevalent among lower-functioning schools, where educational quality is likely to be lower and repetition rates (and therefore, instances of multiple repetition) higher.

flows at the end of 2020 raised the prevalence of multiple repetition to 35 percent and 38 percent in 2020 and 2021 respectively[24], before it returned to 2019 levels in 2022 and dropped even further to 28 percent in 2023. This was the lowest proportion of multiple repeaters on record, surpassing even the MEO years.

Figure 4: Overage status of full-time NSC candidates by quintile group



Source: Own calculations using anonymised NSC 2008-2023 data. '0 years overage' refers to candidates turning 18 or younger in the year in which they wrote the NSC. Percentages are expressed as a proportion of candidates with non-missing ages, and the four given overage age categories sum to 100%.

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[24] While a rise in the prevalence of multiple repetition due to less repetition (i.e. accelerated learner flows) seems counterintuitive, it is due to more academically weaker learners (who are more likely to be multiple-repeaters) being allowed to reach matric—in previous years, such learners would have repeated Grade 11 and/or dropped out prior to reaching matric.

It is not clear why the prevalence of multiple repetition decreased so much for the 2023 cohort. One possible explanation could be systemic reductions in repetition experienced over the cohort's entire schooling career. Alternatively, it could be attributable to the pandemic's more lenient promotion requirements—indicating that many learners who repeated in the FET phase pre-pandemic were first- or second-time repeaters, not 'serial repeaters' who were repeating again as soon as repetition policy permitted it. Either explanation is plausible, but further information is required to know which is true.

Due to overage status's associations with repetition and learner achievement, it would normally be expected that NSC achievement would move inversely to the proportion of overage candidates in an NSC cohort. Referring back to the mean average mark patterns observed in the different quintile groups (Table 1, p.13), it appears that achievement for candidates in Quintile 1 to 3 schools mostly followed expected patterns, except for where the large proportional increase in multiple repeaters between 2019 and 2021 was accompanied by only a small decrease in mean average achievement. Contrary patterns also emerged for candidates in Quintile 5 schools, where achievement in 2021 was higher than in 2019 despite there being proportionally more overage candidates in 2021. In addition, Quintile 5 candidates' mean average mark in 2023 was the lowest of the shown years, despite the year having the highest proportion of appropriately aged candidates. These findings suggest that changes in NSC results cannot be attributed solely to changing age profiles, and that other factors are at play in the determination of NSC achievement.

Gender

Although South Africa's youth population is close to gender balanced, repetition and dropout patterns result in higher proportions of female candidates in the NSC population[25]. Over time, the gender ratio has become increasingly skewed (Table 2), rising from 53.5 percent female students in 2011 to 56.4 percent in 2023. Much of this increase has been concentrated in Quintile 1 to 3 schools, although Quintile 5 schools have also moved towards a higher proportion of female NSC candidates.

There are also large differences in the age of NSC candidates according to gender, especially in poorer schools. Table 2 shows that in 2011, 71.3 percent of male NSC candidates in Quintile 1 to 3 schools were overage, compared to 58.6 percent of female NSC candidates, representing a difference of 12.7 percentage points. In Quintile 5 schools, these numbers were smaller—29 percent and 19.4 percent for males and females, respectively—but a relatively large gap of 9.6 percentage points still existed. Regardless of year and the associated repetition changes, male candidates have persistently been more likely to be overage than female candidates, with the gap both nationally and in the poorer schools reaching its widest in 2023, despite this year having the lowest proportion of overage candidates for both genders.

[25] Repetition rates are higher among male learners, who are subsequently more likely to drop out (Van der Berg et al., 2020). Therefore, females are overrepresented in the NSC population because many male learners are still 'held up' in previous grades or have dropped out of school.

Table 2: Gender statistics by quintile

		Percentage of overage candidates		
	Female %	**Male (A)**	**Female (B)**	**Difference (A-B)**
Quintile 1-3				
2011	53.2%	71.3%	58.6%	12.7%
2019	55.7%	64.5%	48.7%	15.8%
2021	55.2%	69.6%	53.8%	15.8%
2023	56.6%	60.0%	42.6%	17.4%
Quintile 5				
2011	53.5%	29.0%	19.4%	9.6%
2019	55.1%	28.3%	18.5%	9.8%
2021	54.8%	31.7%	21.0%	10.7%
2023	54.9%	27.7%	17.1%	10.5%
National				
2011	53.5%	60.9%	48.4%	12.4%
2019	55.7%	54.7%	40.4%	14.3%
2021	55.3%	61.3%	46.3%	14.9%
2023	56.4%	52.5%	36.6%	15.9%

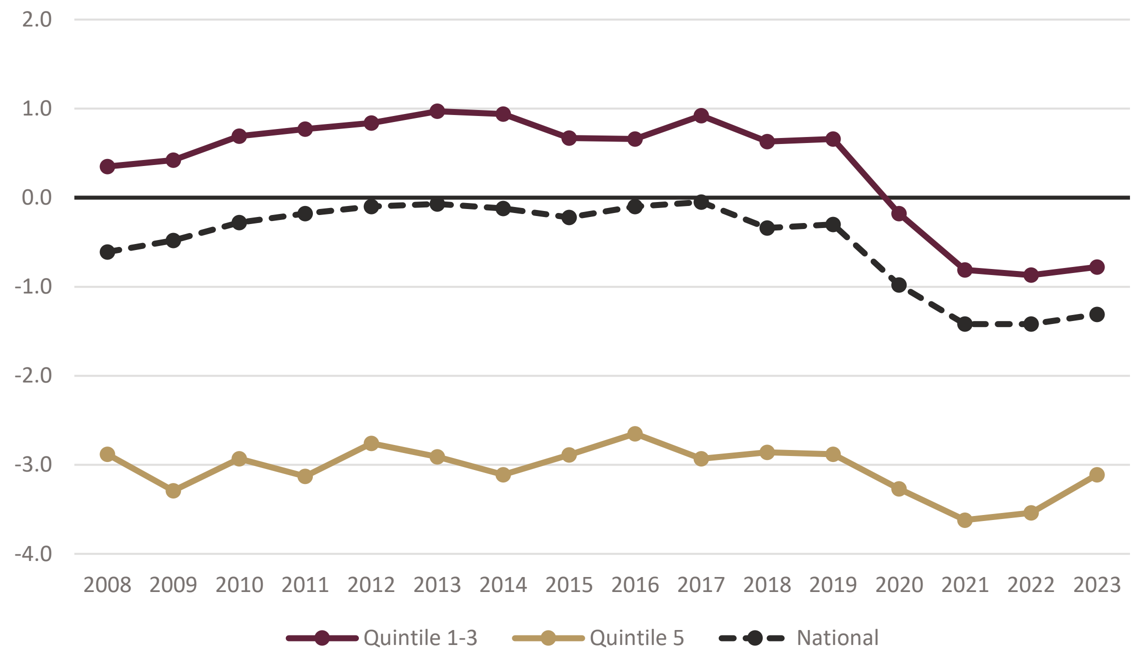
Source: Own calculations using anonymised NSC 2008-2023 data. 'Overage' refers to candidates turning 19 or older in the year in which they wrote the NSC. Candidates with missing age or gender are excluded, as are part-time candidates. 'National' includes candidates in all quintiles (i.e. including Quintile 4 and independent schools).

In light of the differential age and dropout factors by gender, it is not clear what achievement gap—if any—should exist between male and female candidates at NSC level. Figure 5 displays the 'achievement gap' as the difference in mean average marks between male and female candidates, with a positive value illustrating that male candidates' average marks were higher than female candidates' average marks, and a negative value indicating a pro-female achievement gap.

In poorer schools, males consistently outperformed females until 2020, when female candidates began to slightly outperform male candidates. In 2021, a steady female advantage existed in Quintile 1 to 3 schools, and the pro-female gap has since persisted at a level close to the pre-pandemic male advantage. In Quintile 5 schools, a female advantage has been ever-present, but the size of the advantage grew between 2019 and 2021, before narrowing towards pre-pandemic levels by 2023.

Although the pandemic years shifted the age profile of candidates, with potentially differential effects on the two genders, it is not clear that this alone accounts for the large changes in the achievement gap over the 2019-2023 period. For this reason, the empirical analysis in Section 4 explicitly reports the estimated coefficients for a gender variable, while coefficients for other explanatory variables are only reported in the full output in Appendices C and D.

Figure 5: Male advantage in mean average NSC mark by quintile group



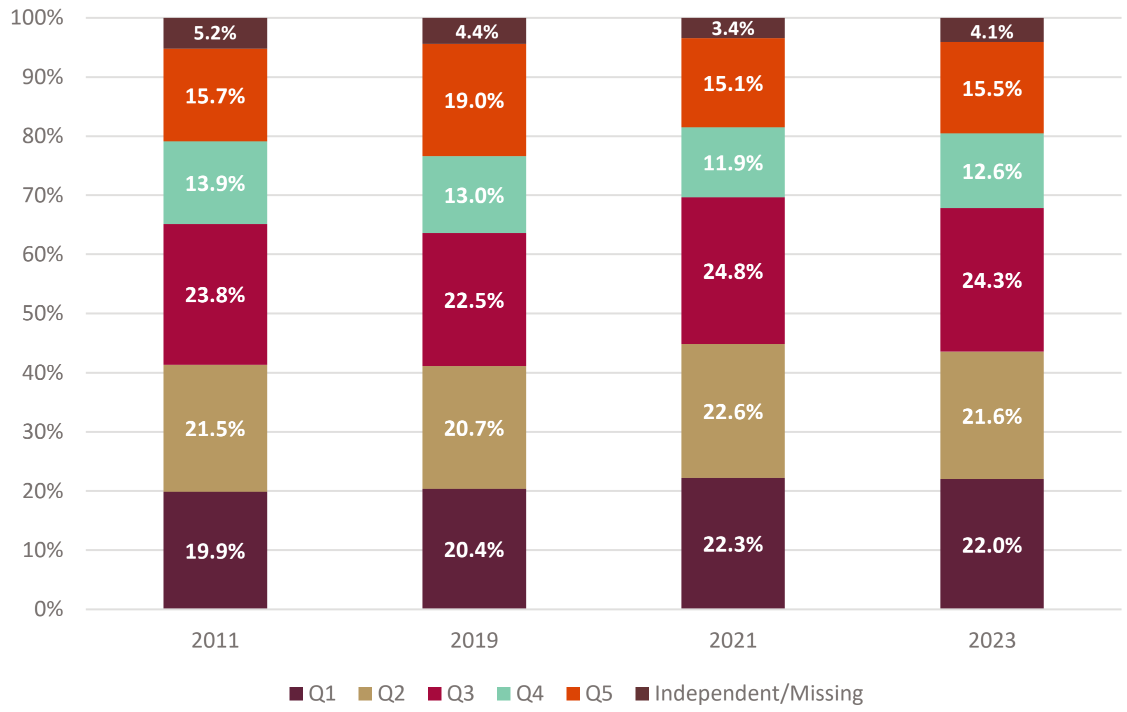
Source: Own calculations using anonymised NSC 2008-2023 data. 'Achievement gap' is the difference between male candidates' average NSC mark and female candidates' average NSC mark, excluding candidates with a missing gender. Average mark calculation excludes life orientation and subjects not examined by the DBE. 'National' includes candidates in all quintiles (i.e. including Quintile 4 and independent schools).

Quintile and province

Quintile and province are both used as control variables in regressions, where indicated. Over time, the provincial share of full-time NSC candidates has not changed much (see Table B4; Appendix B), although provinces such as Western Cape and Gauteng experienced smaller increases in candidate numbers between 2019 and 2021 than other provinces, as discussed in Selkirk & Wills (2024).

In contrast, between 2019 and 2021/23 there were relatively large changes in the distribution of candidates across quintiles, as shown in Figure 6. The biggest change was a movement towards more candidates in Quintile 1 to 3 schools, with these schools comprising 63.6 percent of total candidates in 2019 and close to 70 percent of candidates in 2021. Although a six percentage point increase does not seem very large, the magnitude is notable in absolute terms given the large rise in candidate numbers between 2019 and 2021. Between 2019 and 2021, Quintile 1 to 3 schools experienced an increase of close to 170,000 candidates compared to an increase of approximately 30,000 candidates in other quintiles. This difference was somewhat reduced in 2023, but the net increase in full-time NSC candidates between 2019 and 2023 still remained at approximately 148,000 and 38,000 in Quintile 1 to 3 and other quintiles, respectively.

Figure 6: Quintile share of national full-time NSC candidates



Source: own calculations using anonymised NSC 2008-2023 data. 'Quintile' (Q) refers to the official classification of school wealth quintile, and 'Independent/Missing' refers to independent schools or schools with no quintile information in the NSC data.

Subject choice

As discussed in Section 2, subject choice is an important factor when considering NSC outcomes, and this is even more pertinent when NSC achievement is measured by averaging marks across various subjects. Unfortunately, incorporating subject choice is no easy feat, with the final NSC data set including 131 unique subjects and well over 40,000 unique subject combinations. Various attempts were made to construct a subject difficulty index, but no satisfactory measure was reached[26]. Ultimately, it was decided to control for various popular subjects or subject categories, with subjects classified according to the classification typology used by the Department of Basic Education (DBE, 2012a). Subject popularity varied by quintile, and as a result, different control subjects were used for each quintile group. Table 3 shows subject choice for key subjects in both quintiles, while a full list of subjects and descriptions can be found in Tables B1 and B2 (Appendix B).

Over time, there has been a shift away from commerce and STEM subjects (e.g. accounting, mathematics, and physical science) toward the social sciences (e.g. history and geography) and service subjects (e.g. tourism), especially in poorer schools. It is also interesting to note that—despite Quintile 5 schools being better resourced and perhaps better equipped to produce successful STEM and commerce candidates—these schools

[26] Attempts included methods such as multiple component analysis, or rankings by absolute achievement or achievement relative to candidates' average achievement in other subjects. No satisfactory measure could be reached—in part, due to issues with the comparability of subjects' marks and difficulty across time, and in part due to confoundedness: for example, high marks in a subject could indicate that the subject was relatively easy, or it could indicate that higher-ability candidates self-selected into that subject.

do not have substantially higher proportions of candidates choosing mathematics or accounting, and even have a lower proportion of candidates taking physical science. This suggests that potential inefficiency could be arising from under-allocation of candidates in Quintile 5 schools[27] to STEM and commerce subjects, a finding somewhat supported by Swelindawo and Taylor (forthcoming).

Table 3: Subject choice by quintile group

	2011	2019	2021	2023	Change: 2011 to 2023	Change: 2019 to 2023
Quintile 1-3:						
FT Candidates	*323,315*	*320,872*	*490,423*	*469,113*		
Mathematics	45.3%	44.2%	36.5%	37.3%	-8.0%	-6.9%
Math Literacy	54.7%	54.3%	61.9%	60.7%	6.0%	6.5%
Physical Science	37.3%	33.3%	28.6%	30.7%	-6.6%	-2.6%
Geography	43.7%	54.5%	55.2%	54.2%	10.4%	-0.3%
History	18.0%	29.0%	32.3%	32.9%	14.9%	3.9%
Arts (any)	0.9%	2.3%	2.6%	3.0%	2.1%	0.7%
Tourism	15.5%	23.8%	27.9%	30.6%	15.1%	6.8%
Accounting	28.2%	14.9%	14.1%	13.6%	-14.5%	-1.2%
Quintile 5:						
FT Candidates	*77,895*	*95,732*	*106,190*	*107,120*		
Mathematics	46.6%	43.1%	38.8%	40.8%	-5.8%	-2.3%
Math Literacy	53.4%	54.5%	59.3%	56.9%	3.5%	2.4%
Physical Science	32.9%	28.6%	26.0%	27.2%	-5.7%	-1.4%
Geography	26.2%	34.0%	32.4%	31.5%	5.3%	-2.5%
History	14.4%	25.0%	27.0%	26.5%	12.2%	1.6%
Arts (any)	10.6%	10.7%	9.8%	9.4%	-1.2%	-1.3%
Tourism	17.3%	18.1%	22.9%	23.6%	6.3%	5.5%
Accounting	25.0%	16.6%	18.4%	17.5%	-7.5%	0.9%

Source: Own calculations using anonymised NSC 2008-2023 data. 'Arts (any)' refers to the percentage of students taking at least one of the five official arts subjects (dance, design, drama, music, art). From 2019, Mathematics and Mathematical Literacy do not sum to 100% because of the introduction of Technical Mathematics. 'Change' refers to the absolute change in subject choice, and 'FT Candidates' refers to the count of full-time candidates.

Aside from the aforementioned subject choice controls, the regression analysis in Section 4 also controls for which home language examination(s) are written by each candidate[28]. Most language examination controls were omitted from the Quintile 5 analysis due to lack of variation, with close to 70 percent of candidates writing the English Home Language examination. However, one addition to the Quintile 5 analysis was a control for isiZulu First Additional Language (FAL), since marks for isiZulu FAL were substantially higher than candidates' other marks in all years. Table B3 (Appendix B) provides language subject

[27] Conversely, the potential inefficiency could arise from over-allocation of candidates in poorer schools.
[28] It should be noted that there was a strong correlation between certain provinces and languages for the Quintile 1 to 3 group, which may confound estimated coefficients for the province and language controls.

choice for the two quintile groups, from which it can be seen that the language examination choice of NSC cohorts has been largely stable over time.

The analysis also includes a dummy variable to control for candidates taking the technical, rather than academic, pathway. These candidates account for approximately three to four percent of total NSC full-time candidates each year, a percentage that has undergone minimal fluctuations over 2008-2023.

Life Orientation

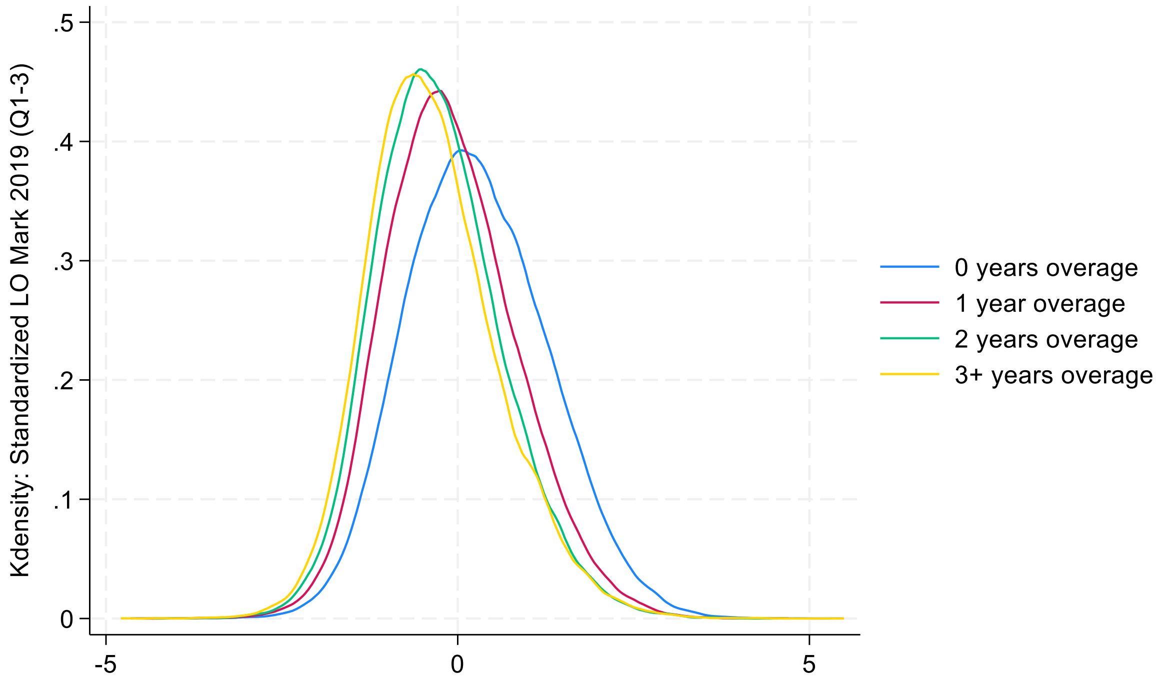
None of the variables that have been discussed control for candidate ability, although there is doubtless correlation between academic ability and factors such as overage status and subject choice. Life orientation (LO) is a subject taken by all matric learners, but it is not an externally examined or standardized subject, and marks are likely not comparable across schools[29]. However, it is plausible that candidates' LO marks—relative to their schoolmates' marks—provide a semi-ordinal indication of academic ability. The assumption is therefore made that while raw LO marks cannot be compared across years and schools, the marks give some indication of candidates' relative academic ability when compared with the marks of other candidates in the same school.

A standardized LO mark variable was created to have a mean of zero and standard deviation of one within a school in a particular year. Prior to this, it was verified that LO marks varied enough within schools for a standardized LO mark to be appropriate. Various descriptive statistics support the assumption that standardized LO marks provide a general proxy for candidates' academic ability. For example, Figure 7 shows the distribution of the Quintile 1 to 3 candidates' standardized LO marks in 2019 by overage status. Standardized LO marks were highest for appropriately aged candidates and lowest for very overage (3+ years overage) candidates, which aligns with expected academic ability patterns. Similar findings existed for other years and for Quintile 5 candidates. Standardized LO marks also aligned with expected subject choice patterns, with higher achievers opting for subjects such as mathematics, physical science and accounting, and lower achievers more likely to write the mathematical literacy, tourism and geography examinations.

It is also possible that standardized life orientation marks could reflect learners' language skills or socio-emotional skills, not solely their academic ability. More research would need to be done to investigate exactly what LO marks reflect, but for the present study the simplifying assumption is made that the variable captures relative academic ability. The analysis in Section 4 is shown and discussed both with and without the inclusion of standardized LO mark, so that it does not unduly influence the findings if it is a noisy measure.

[29] Umalusi does conduct external moderation of life orientation's common assessment tasks (Umalusi, 2022b), but it is not clear that this process achieves strict comparability of final LO marks across schools.

Figure 7: Distribution of Standardized Life Orientation Marks (Quintile 1 to 3; 2019)



Source: Own calculations using anonymised NSC 2008-2023 data. Only full-time candidates are included, and Life Orientation marks are standardized at a school level to have a mean of zero and a standard deviation of one.

3.2 Methodology

The present paper uses a combination of Ordinary Least Squares (OLS) and Fixed Effects regression techniques to analyse the NSC data, after which an Oaxaca-Blinder decomposition is applied across various years to investigate reasons for changes in NSC achievement over time. This section discusses the underlying methodology and intuitive reasoning behind the analysis presented in Section 4.

The analysis begins with a standard learner-level education production function, considering standalone years' data with OLS regressions in the following form:

$$Average\ NSC\ mark_i = \beta_1 overage\ status_i + \beta_2 \boldsymbol{l}_i + \beta_3 \boldsymbol{z}_i + \beta_4 \boldsymbol{s}_i + c + \varepsilon_i \quad [1]$$

In the above equation, $\boldsymbol{l}$ is a vector of learner characteristics; $\boldsymbol{z}$ is a vector of provincial and school quintile controls; $\boldsymbol{s}$ is a vector of subject choice; $\beta' s$ are vectors of estimated coefficients; c is a constant; and ε is an error term. The subscript refers to an individual candidate *i*. For the reasons explained in Section 4.3.1, specific attention is given to β_1, the coefficient vector of the estimated effect of overage status on NSC achievement.

The above equation is manipulated for the Oaxaca-Blinder decomposition. To demonstrate this process, a simplified version of equation [1] will be used:

$$Y_t = \alpha_t + \beta_t \boldsymbol{X}_t \quad [2]$$

Average NSC achievement in year t for individual candidates is now represented by Y_t; α_t is the constant term; and $\boldsymbol{X_t}$ represents all of the covariates previously expressed separately in equation [1]. Equation [2] can be rearranged to express the difference in performance between two years as:

$$Y_{2023} - Y_{2019} = (\alpha_{2023} - \alpha_{2019}) + (\beta_{2023} - \beta_{2019})X_{2019} + \beta_{2023}(X_{2023} - X_{2019}) \qquad [3]$$

Equation [3] expresses the difference in mean achievement between 2023 and 2019 as the sum of two components: $\beta_{2023}(X_{2023} - X_{2019})$, the part that can be explained by differences in the cohort characteristics (or endowments); and the residual term, $(\alpha_{2023} - \alpha_{2019}) + (\beta_{2023} - \beta_{2019})X_{2019}$, which cannot be explained by differences in endowments, but could rather represent changes in the effectiveness of inputs into the education production function (reflected by the changes to the estimated coefficients). This residual term is therefore termed as being 'unexplained', since it cannot be explained by differences in observable characteristics between years.

The present paper uses a three-fold decomposition approach as per Jann (2008), with the third component being an interaction term attributable to simultaneous differences in both the endowments and coefficients. All decomposition results were obtained using the *oaxaca* package in Stata 18, and the categorical age, provincial and quintile variables were normalized to reduce the sensitivity of estimates to the choice of reference categories.

The overall logic of the Oaxaca-Blinder decomposition can be demonstrated with a simplified example. Suppose NSC achievement depended solely on candidates' overage status, with achievement negatively associated with being overage. If achievement rose over time, it could have been caused by:

1. A decline in the proportion of overage candidates in the NSC population, or
2. Overage candidates receiving less of a penalty for being overage.

The first instance can be 'explained' because it relates to observable population characteristics, while the second instance is 'unexplained' and requires contextual information on the cause for such changes. For example, it could be that overage candidates in more recent years received increased remediation, and overage status thereby attracted less of an achievement penalty because of these catch-up efforts.

A third consideration is the potential interactions between the levels and returns to overage status. In the above example, the combination of relatively fewer overage candidates and more remediation may have allowed for better targeting of remediation efforts, thereby increasing achievement by more than would be experienced if only one of these factors had changed over time. This additional effect is termed the 'interaction' in the threefold decomposition. Estimated interaction effects are usually quite small and do not lend themselves to clear interpretation, therefore they are reported but not discussed in the majority of this paper.

It should be emphasised that results obtained from the Oaxaca-Blinder decomposition are not necessarily causal, and on their own may not provide explicit explanations for changes in achievement over time. For example, a change in the efficiency of subject choice could be attributable to differing standards in each subject across years, or it could be attributable to unobserved factors correlated with subject choice. Nevertheless, the decomposition results are informative and provide valuable direction regarding which factors warrant further investigation. It is also useful to confirm the existence of limitations with the NSC results and data which have been discussed in the literature, but rarely accompanied by quantitative evidence.

4. Results

4.1 OLS and Fixed Effects estimation (Quintile 1 to 3)

The 2019 Quintile 1 to 3 sample will be used to demonstrate the steps that were taken to arrive at the final functional form of the regression equation. Table 4 provides the estimates obtained under each model, which show how the estimated overage coefficients change as additional controls are added.

Table 4: Regression output for candidates' average NSC mark in 2019 (Quintile 1 to 3)

Outcome: Average mark	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) FE
1 year overage	-4.724***	-4.950***	-4.694***	-3.143***	-2.769***
	(0.044)	(0.044)	(0.044)	(0.037)	(0.041)
2 years overage	-7.011***	-7.372***	-7.012***	-4.702***	-4.107***
	(0.050)	(0.049)	(0.049)	(0.042)	(0.052)
3+ years overage	-8.996***	-9.412***	-8.976***	-6.321***	-5.517***
	(0.048)	(0.049)	(0.049)	(0.042)	(0.063)
Female		-1.976***	-1.907***	-2.629***	-2.625***
		(0.036)	(0.035)	(0.029)	(0.037)
Quintile 2		1.039***	0.768***	0.685***	
		(0.043)	(0.044)	(0.036)	
Quintile 3		0.897***	0.708***	0.682***	
		(0.044)	(0.044)	(0.037)	
Standardized LO mark				5.770***	5.989***
				(0.017)	(0.034)
Constant	50.648***	51.660***	53.039***	54.451***	52.913***
	(0.028)	(0.064)	(0.148)	(0.123)	(0.357)
Observations	320,867	320,867	320,867	320,861	320,861
R-squared	0.116	0.139	0.167	0.420	0.467
Controls:					
Province		X	X	X	
Tech student		X	X	X	X
Subject choice			X	X	X
Fixed effects					School FE
Year	2019	2019	2019	2019	2019
Sample	Q1-3	Q1-3	Q1-3	Q1-3	Q1-3

Robust standard errors in parentheses. The reference category is appropriately aged male candidates in Quintile 1 schools. 'Subject choice' refers to both language and subject choices. The negligible reduction of sample size in regressions (4) and (5) is due to observations where a standardized life orientation mark did not exist.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

When only age is controlled for in model (1), approximately 12 percent of the variation in NSC achievement can be explained, with achievement significantly deteriorating for every additional year that candidates are overage. The steepest penalties for being one additional year overage occur for candidates one year overage and candidates two years overage, with a smaller additional penalty incurred for candidates three or more years overage.

Model (2) adds controls for gender, school quintile, academic pathway, and province, which slightly improves the model's explanatory power and increases the size of the negative penalty incurred by very overage (3+ years overage) candidates. The gender gap is pro-male, and small but statistically significant differences existed between quintiles. The addition of subject choice—which includes choice of home language examination(s)—in model (3) further increases the R-squared value, bringing it to 0.167, while the relationship between overage status and average NSC mark remains similar to that found in the other models. The pro-male gap is still significant and of a similar magnitude, while Quintiles 2 and 3 are no longer statistically different from one another (but they do have statistically significantly better achievement than candidates in Quintile 1 schools). The full regression output can be found in Table C1 (Appendix C), for those interested in the detailed associations between subject choice and achievement.

The final addition to the model is standardized life orientation (LO) mark[30], and the result of this is shown under model (4). The inclusion of this single variable results in a large increase in the r-squared value (from 0.167 to 0.42) and also changes many of the estimated coefficients. While overage status is still negatively associated with NSC achievement, controlling for relative ability in this manner decreases the size of the coefficients for all overage groups. Compared to model (3), the negative penalty for being one year overage is reduced from 4.69 to 3.14 marks, and for candidates three or more years overage the penalty declines from 8.98 to 6.32 marks[31]. The pro-male achievement gap also widens slightly, while Quintiles 2 and 3 remain statistically similar to each other, but different from Quintile 1 (the reference category in model (4)).

Model (4) also shows the large and strong association between standardized LO marks and NSC achievement, with a one standard deviation increase in relative LO achievement associated with a 5.77 average mark increase in candidates' NSC achievement. Furthermore, as reported in Table C1 (Appendix C), many of the estimated subject choice coefficients change as a result of life orientation's inclusion. If standardized LO mark is correctly capturing academic ability as intended, then the changes in the estimated subject choice coefficients can be interpreted as the reduction of bias[32], and the new coefficients would more accurately reflect subject difficulty.

[30] A proxy for academic ability, as discussed in Section 3.
[31] For overage penalties, the reference group is appropriately aged candidates.
[32] This bias would come from non-random sorting of candidates into subjects, based on academic ability. Without controlling for academic ability, difficult subjects that are chosen by mainly high-ability candidates may have large positive estimated associations with candidates' average NSC marks. The coefficients would be capturing learner ability and not subject difficulty, which would erroneously suggest that such subjects were easy. By controlling for candidates' academic ability (e.g. model (4)), such subjects would have a much smaller estimated coefficient (possibly even negative) that would more accurately reflect subject difficulty. This effect would be reversed for subjects that are easier and disproportionately selected by low-ability candidates.

A fixed effects model was run to check that unobserved school characteristics were not meaningfully influencing the results obtained under OLS. The results of the fixed effects estimation are shown under Model (5), where negative associations between age and achievement declined slightly, but the overall patterns persist and remain statistically significant. The coefficients on gender and the standardized LO mark remained statistically significant and of similar magnitude to those obtained under OLS estimation, with the main changes in coefficients occurring for the subject choice controls, as can be seen in Table C1 (Appendix C).

As mentioned at the start of this section, the various models were run as part of a process to identify the most appropriate model specification for the analysis. Based on models (1) to (5), it appeared prudent to include standardized LO mark in the final regression model to avoid overinflating the negative penalties incurred by overage candidates. While model (5) may technically be most accurate, the differences between the OLS and fixed effects models were not large enough to raise significant concerns that model (4) would be unsuitable as a final model specification. This is important, because fixed effects are challenging to include in Oaxaca-Blinder decomposition. In addition, the use of fixed effects would require strong assumptions regarding the consistency of individual schools' fixed effects across time—assumptions that would likely be violated with the long time period under consideration in the current analysis. Model (4) was therefore chosen for use in the Oaxaca-Blinder decompositions.

Prior to the year-pair decompositions, it is useful to compare the estimated coefficients for the single-year models to guide the interpretation of the 'unexplained' changes in achievement. Table 5 applies model (4) to the four relevant years—labelled as models (6) to (9)—and the full results appear in Table C2 in Appendix C. It is clear that the estimated coefficients do differ by year, so the Oaxaca-Blinder decompositions will be useful in quantifying the extent to which these changes contributed to the overall difference in achievement. In terms of explanatory power, the model best explains average NSC marks in recent years (2021 and 2023), despite the model specification being based on 2019's data. This appears to be largely attributable to overage status and standardized life orientation marks explaining more of the variation in achievement than in earlier years.

Of the four years under study, the negative effects of being overage were largest in 2021, especially for the two highest overage categories. A possible interpretation of this could be that multiple-repeaters[33] in the 2021 NSC cohort were academically weaker than multiple-repeaters in other years. This is plausible, since many of the multiple-repeaters in the 2021 NSC cohort likely benefitted from the more lenient promotion requirements at the end of 2020[34]. This change in academic ability would not necessarily be captured by

[33] Learners two or more years overage, assumed to have repeated more than once during their school career.
[34] The implication of more lenient promotion requirements is two-fold: firstly, learners two or more years overage in the 2021 NSC cohort might not have reached matric if previous years' stricter promotion requirements had applied; and secondly, such learners would usually have been an additional year overage if/when they did reach matric. So, some of the learners who were '2 years overage' in 2021 would normally have been included in the '3+ years overage' category in their matric year, and the candidates in 2021 who *were* in the '3+ years overage' category in 2021 would normally have belonged to the older subset of '3+ years overage' candidates. The implication is that 2021's age categories might have been more representative of other years' older age categories, and also that there may have been more academically weaker would-be dropouts in the 2021 'very overage' categories than existed in other NSC years.

the standardized LO mark, as it is likely that the higher flows to Grade 12 in 2021 would have altered the levels and distribution of LO marks within a school, thereby reducing its discriminatory power with regard to academic ability[35].

Table 5: Regression output for candidates' average NSC mark (Quintile 1 to 3) in various years

Outcome: Average mark	(6) 2011	(7) 2019	(8) 2021	(9) 2023
1 year overage	-3.177***	-3.143***	-3.863***	-3.453***
	(0.040)	(0.037)	(0.033)	(0.032)
2 years overage	-4.753***	-4.702***	-6.090***	-5.196***
	(0.044)	(0.042)	(0.036)	(0.039)
3+ years overage	-6.722***	-6.322***	-8.593***	-6.858***
	(0.041)	(0.042)	(0.036)	(0.039)
Missing age	-4.132***	-7.656***	-2.009	-0.410***
	(0.051)	(2.818)	(2.462)	(0.073)
Female	-2.213***	-2.630***	-2.079***	-2.063***
	(0.028)	(0.029)	(0.025)	(0.026)
Quintile 2	0.767***	0.685***	0.550***	0.187***
	(0.035)	(0.036)	(0.031)	(0.032)
Quintile 3	0.879***	0.682***	0.411***	-0.112***
	(0.036)	(0.037)	(0.032)	(0.032)
Standardized LO mark	5.030***	5.770***	6.398***	6.862***
	(0.017)	(0.017)	(0.015)	(0.015)
Constant	48.660***	54.451***	54.272***	57.076***
	(0.131)	(0.123)	(0.106)	(0.107)
Observations	323,315	320,866	490,423	469,110
R-squared	0.381	0.420	0.465	0.460
Controls:				
Province	X	X	X	X
Tech student	X	X	X	X
Subject choice	X	X	X	X
Year	2011	2019	2021	2023
Sample	Q1-3	Q1-3	Q1-3	Q1-3

Robust standard errors in parentheses. The reference category is appropriately aged male candidates in Quintile 1 schools. 'Subject choice' refers to both language and subject choices. Candidates in the 'missing age' category are negligible in all years except 2011.
*** p<0.01, ** p<0.05, * p<0.1

A 'missing age' category was included in the regressions in Table 5 because of the prevalence of missing age data in 2011, but the estimated coefficients cannot be meaningfully compared across years because of the small numbers of candidates with missing ages post-2016. It is nevertheless worthwhile noting that candidates with missing age data in 2011 received a significant penalty. This penalty was of similar magnitude to the one incurred by candidates who were two years overage, and it indicates that missing age data was likely non-random—therefore age statistics presented in Section 3 (for

[35] If more low-ability candidates reached Grade 12 in 2021, the average LO mark within a school would be expected to be lower and there would be more candidates toward the bottom end of the school's LO achievement distribution. Therefore—since standardized LO mark is calculated relative to schoolmates, who were overall weaker in 2021—the standardized LO marks of overage learners in 2021 might not indicate that these learners were academically weaker than previous NSC years' overage learners, and this would instead reflect in the estimated coefficients on overage status.

example, Figure 2, p.14) may have underestimated age (and the prevalence of overage candidates) in the NSC data's early years.

The findings in Table 5 also show that over time the pro-male achievement gap shrunk slightly, but that it remained statistically significant at a magnitude of approximately two average marks in 2021 and 2023. This is an important finding, since it contradicts the pro-female gap shown in the descriptive statistics in Section 3. The interpretation is that the female advantage in NSC achievement which emerged post-2020 is an artificial advantage that can be explained by overage status, academic ability, and subject choice, and that male candidates continue to outperform female candidates in Quintile 1 to 3 schools once these factors are controlled for. However, this finding requires further investigation, as the results are somewhat sensitive to the inclusion of the standardized life orientation mark: excluding this mark results in an approximate halving of the pro-male gap between 2019 and 2021, with a further decline by 2023, although the estimated female coefficient remains negative and significant (see Table C3; Appendix C).

Finally, the regressions show a relatively large decline in the achievement gap between Quintile 1 and Quintile 3 schools between 2021 and 2023, with Quintile 3 schools performing even worse than Quintile 1 schools in 2023, which is counterintuitive. Quintile 2 schools' advantage over Quintile 1 schools similarly declined, but remained positive in all years. Although the changes in quintile effects are large relative to their 2011 coefficients, the overall quintile differences are nevertheless small.

4.2 Oaxaca-Blinder decomposition (Quintile 1 to 3)

Multiple Oaxaca-Blinder decompositions were performed—one for each pair of years—and the summarized results are presented in Table 6, where values indicate mean average NSC marks. 'Endowments' is the 'explained' change in average marks, 'coefficients' is the 'unexplained' change, and 'interaction' refers to the interaction effect, as discussed in Section 3.2. Each component's contribution to the difference in mean average marks was also calculated as a percentage (shown in parentheses) of the total, with the sum of the three components by definition equalling 100 percent. Negative percentages in Table 6 indicate that the relevant component decreased the achievement difference between years.

Of all the time periods considered in Table 6, 2019-2021 was the only period where mean average NSC mark declined, as indicated by the positive difference of 0.56. The largest difference in achievement was the increase of 6.35 average marks between 2011 and 2023. Regardless of the size and direction of the achievement difference, for all pairs of years the majority of the difference in achievement could not be explained by differences in endowments, but was rather attributable to changes in coefficients and, to a lesser extent, interactions. With the exception of the interaction effect for the 2011-2019 decomposition, all achievement differences and component contributions were statistically significant at a one percent level.

Table 6: Summarized Oaxaca-Blinder decomposition results (Quintile 1 to 3)

	2011/19	**2019/21**	**2021/23**	**2019/23**	**2011/23**
Year 1	42.74	46.93	46.37	46.93	42.74
Year 2	46.93	46.37	49.09	49.09	49.09
Difference (Y1-Y2)	**-4.18**	**0.56**	**-2.72**	**-2.16**	**-6.35**
<u>*Breakdown of difference:*</u>					
Endowments	-1.18***	0.21***	-0.62***	-0.52***	-0.59***
	(28%)	(39%)	(23%)	(24%)	(9%)
Coefficients	-3.4***	0.47***	-1.86***	-1.59***	-5.02***
	(81%)	(85%)	(68%)	(74%)	(79%)
Interaction	0.39	-0.13***	-0.24***	-0.05***	-0.73***
	(-9%)	(-24%)	(9%)	(2%)	(11%)

*Source: Own calculations using NSC 2008-2023 data. 'Year 1' refers to the earlier year listed in the column header, so a negative difference therefore signals an increase in average NSC achievement over time. Asterisks indicate statistical significance: *** p<0.01, ** p<0.05, * p<0.1*

The difference in achievement between years was best explained between 2019 and 2021—39 percent, albeit for a very small difference in achievement—and was least explained between 2011 and 2023 (nine percent). In other time periods, close to a quarter of the difference in achievement could be explained. Table 7 provides a more detailed breakdown of the endowment and coefficient effects, and the full decomposition results with interaction effects can be found Appendix D (Tables D1-D5).

For ease of discussion and presentation, related control variables were grouped together into the categories 'Provincial', 'Subject Choice', and 'Language Choice' in Table 7, with standard errors and significance values for these groups calculated by the *oaxaca* Stata package. Standardized life orientation mark and Quintile 2 and 3's contributions to the overall endowment and coefficient effects are not shown where they were statistically insignificant and/or rounded to zero at two decimal places.

It is worth reiterating the interpretation of the values in Table 7. The overall difference in achievement (***Difference***) is calculated by subtracting the mean Year 2 average mark from the mean Year 1 average mark, with 'Year 1' referring to the earlier year of the pair. The sum of the individual endowment effects and coefficient effects are shown in the relevant column headers, with the following meanings:

- ***Endowments:*** The change in achievement attributable to differences in the composition of the NSC cohort in each year
- ***Coefficients:*** The change in achievement attributable to differences in the estimated coefficients for each year

Negative values indicate a more favourable NSC composition or more favourable coefficients in the later year, where 'favourable' refers to endowments or coefficients being associated with higher achievement (or smaller reductions in achievement). Table 7 has been colour coded to indicate this, with negative values (i.e. factors increasing achievement) in the darker colour, positive values (i.e. factors decreasing achievement) in the lighter colour, and statistically insignificant or zero values remaining colourless.

Table 7: Summarized endowment and coefficient contributions (Quintile 1 to 3)

	2011/19	2019/21	2021/23	2019/23	2011/23
Difference	***-4.18***	***0.56***	***-2.72***	***-2.16***	***-6.35***
Endowments	***-1.18***	***0.21***	***-0.62***	***-0.52***	***-0.59***
0 years overage	-0.58***	0.21***	-0.34***	-0.18***	-0.60***
1 year overage	-0.02**	0	0	0***	0***
2 years overage	0	0.03***	-0.08***	-0.05***	-0.04***
3+ years overage	-0.06***	0.20***	-0.26***	-0.09***	-0.20***
Missing age	-0.41	0	0**	0	0.34***
Female	0.07***	-0.01***	0.03***	0.02***	0.07***
Provincial	-0.02***	0	0.04***	0.03***	0.08***
Subject Choice	-0.17***	-0.19***	-0.02***	-0.21***	-0.23***
Language Choice	0	-0.04***	0	-0.05***	-0.02***
Coefficients	***-3.40***	***0.47***	***-1.86***	***-1.59***	***-5.02***
0 years overage	-0.27	0.10	0.46*	0.59**	0.29***
1 year overage	-0.15	0.22	0.12	0.33***	0.19***
2 years overage	-0.10	0.27**	0	0.22***	0.13***
3+ years overage	-0.18*	0.55***	-0.12	0.26***	0.11***
Female	0.23***	-0.30***	-0.01	-0.32***	-0.08***
Q1	-0.03***	-0.04***	-0.10***	-0.14***	-0.17***
Q2	0	0	0.02***	0.02**	0.02**
Q3	0.04***	0.05***	0.08***	0.13***	0.17***
Provincial	0.09***	-0.07***	-0.55***	-0.61***	-0.59***
Subject Choice	-0.26	-0.50***	1.11***	0.62***	0.38**
Language Choice	-0.26***	0.53***	0.33***	0.84***	0.58***
Constant	-2.51***	-0.33	-3.21***	-3.53***	-6.04***

*Source: Own calculations from Oaxaca-Blinder decomposition using NSC 2008-2023 data. Standardized life orientation mark's contribution is not shown, nor are quintiles' endowments effects and any of the variables' interaction effects. 'Provincial', 'Subject Choice', and 'Language Choice' refer to groupings of variables. Age, quintile, and provincial categorical variables are normalized. *** p<0.01, ** p<0.05, * p<0.1*

The last column of Table 7 decomposes the 6.35 average mark increase in achievement over the entire period 2011-2023. The largest contribution to this improved performance came from unexplained increases in the constant term, representing improvements in unobserved factors not included in the model. Given the long time period and the documented educational improvements in South Africa's school system over time (Gustafsson & Taylor, 2022; DBE, 2023b; Gustafsson, 2017), such a finding is not unexpected. However, it is not possible to quantify how much of the unexplained increase is attributable to educational quality improvements and how much is attributable to other unobserved factors.

Compared to the effect of the constant term, other coefficient effects between 2011 and 2023 were relatively minor. More favourable provincial coefficients could be reflecting improved administration capacity in certain provinces, while more research is needed to understand why coefficients for Quintile 1 schools improved relative to Quintile 3 schools. It is also interesting that most observed factors' coefficients became less favourable between 2011 and 2023, although the magnitude of these (negative) contributions to the overall change in achievement across 2011-2023 was relatively minor.

As already shown in Table 6, compositional (endowment) changes only accounted for nine percent of the increase in achievement between 2011 and 2023. The endowment contributions in Table 7 indicate that the majority of this 'explained' effect was attributable to an improved age profile of NSC candidates and a movement towards subjects associated with higher achievement[36].

Considering the differences in pre- and post-pandemic achievement (2019-2023: second last column, Table 7), approximately 60 percent of the explainable improvement in achievement is attributable to a more favourable age profile, with most of the remainder accounted for by easier subject choice in 2023. However, the improved age and subject choice endowments were both more than offset by their corresponding coefficient effects, resulting in a net decrease in achievement from these two factors (ignoring interaction effects). The unexplained increase in achievement (74 percent of the total increase in achievement) was therefore driven by improvements to unobserved factors outside the model (222 percent of the total coefficient contribution), with smaller improvements in the coefficients on gender and provincial variables. The net quintile effect was close to zero, with deterioration in the coefficients for Quintile 2 and 3 candidates cancelling out the effects of improved coefficients for Quintile 1 candidates. Without the negative coefficient effects from age, subject, and language choice, average marks in 2023 would have been approximately two additional marks higher.

Unfortunately, no obvious explanation satisfies the 2019-2023 decomposition findings, and further disaggregation of years (2019-2021; 2021-2023) is of little assistance in this matter. It is, however, interesting to compare the contributions of overage status to the differences in achievement. For both two-year pandemic periods[37], age endowments accounted for over 100 percent of the total endowment effect, and the age coefficient effects were also relatively large for multiple-repeaters in the 2019-2021 decomposition. The sum of the overage variables' statistically significant endowment and coefficient contributions equated to over 200 percent of the decline in mean average NSC mark between 2019 and 2021. This indicates that 2021 achievement would have been even lower in 2021 if other variables' coefficients had not improved over the same period. In contrast, over the period 2021 to 2023, overage variables' statistically significant endowment and coefficient effects contributed less than 40 percent to the overall increase in achievement, with endowment effects for appropriately-aged candidates and those three or more years overage contributing most to the overall age effect.

The practical interpretation of the decomposition results will be discussed further in Section 5 once they can be compared to the Quintile 5 decomposition findings.

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[36] The specific changes that occurred in age profiles and subject choice are provided in Figure 4 (p.16) and in Appendix B (Tables B1 to B5).

[37] Specifically, 2019-2021 and 2021-2023.

4.3 OLS and Fixed Effects estimation (Quintile 5)

To arrive at the final regression model for the Quintile 5 sample, a similar process was followed as for Quintile 1 to 3 schools. As previously discussed, the final model specification differs slightly from the Quintile 1 to 3 specification, owing to subject and language choice differences—the full Quintile 5 model specification, and the steps taken to get there, appear in Table C4 (Appendix C).

As a precursor to the Oaxaca-Blinder decomposition, Table 8 presents the summarized OLS regression results for candidates in Quintile 5 schools, for each of the relevant four years (see Table C5 in Appendix C for the full regression results). For all years, overage status attracted a larger negative penalty for candidates in Quintile 5 schools compared to Quintile 1 to 3 schools, likely due to the lower prevalence of repetition—and especially multiple-repetition—in Quintile 5 schools. Similar to the Quintile 1 to 3 findings, the negative coefficients on overage status were largest in 2021 (model (12)), but candidates who were one year overage experienced a larger increase in their penalty than was experienced by candidates in Quintile 1 to 3 schools.

Table 8: Summarized OLS regression output for Quintile 5 schools in various years

Outcome: Average mark	(10) 2011	(11) 2019	(12) 2021	(13) 2023
1 year overage	-4.382***	-4.266***	-5.119***	-4.652***
	(0.094)	(0.081)	(0.081)	(0.081)
2 years overage	-8.704***	-8.127***	-9.165***	-8.156***
	(0.160)	(0.129)	(0.118)	(0.132)
3+ years overage	-11.824***	-10.556***	-11.758***	-10.221***
	(0.249)	(0.226)	(0.176)	(0.218)
Missing age	-5.147***		-0.380**	
	(0.186)		(0.183)	
Female	-0.311***	-0.461***	-0.059	-0.180***
	(0.080)	(0.067)	(0.065)	(0.065)
Standardized LO mark	5.544***	5.944***	6.288***	6.522***
	(0.042)	(0.036)	(0.037)	(0.036)
Constant	55.393***	59.486***	58.746***	57.773***
	(0.312)	(0.324)	(0.302)	(0.292)
Observations	77,895	95,732	106,190	107,120
R-squared	0.400	0.444	0.457	0.442
Controls:				
Province	X	X	X	X
Tech student	X	X	X	X
Subject choice	X	X	X	X
Year	2011	2019	2021	2023
Sample	Q5	Q5	Q5	Q5

Robust standard errors in parentheses. The reference category is appropriately aged male candidates. Candidates in the 'missing age' category are negligible in 2021.
*** p<0.01, ** p<0.05, * p<0.1

The Quintile 5 pro-female achievement gap in mean average NSC mark that was shown in Section 3 was eliminated once other factors were controlled for. The resulting pro-male gap was largest in 2019, but became small and insignificant in 2021 before widening in 2023—although it remained much lower than both 2011 and 2019. Compared to the gender gap in Quintile 1 to 3 schools, the pro-male gap for Quintile 5 candidates was much smaller and less stable. However, the gender coefficient was similarly sensitive to the exclusion of standardized LO mark, and even reverses to become pro-female in all years if standardized LO is excluded as a control for the Quintile 5 sample (Table C6; Appx. C).

The explanatory power of the model stayed within a fairly narrow range across all four years, from a minimum of 0.400 in 2011 to a high of 0.457 in 2021. Compared to the Quintile 1 to 3 models, the Quintile 5 R-squared values were slightly higher in the earlier two years, but lower in 2021 and 2023.

4.4 Oaxaca-Blinder decomposition (Quintile 5)

Summarized Oaxaca-Blinder decomposition results for candidates in Quintile 5 schools are displayed in Table 9. Between all pairs of years except for 2019-2021, average achievement decreased in Quintile 5 schools, as indicated by the positive 'difference' values. As with Quintile 1 to 3 schools, little of the difference in achievement across years could be explained by endowments. In fact, for both the 2019-2021 and 2021-2023 periods, endowment effects were the opposite sign to the difference, meaning that achievement would have been even higher in 2021 and decreased even more by 2023 in the absence of composition changes. Changes in endowments did not make a statistically significant contribution to the difference in achievement between 2019 and 2023, but endowment effects were significant in all other years. Overall, the largest decrease in average achievement arose when 2011 was used as a starting point, with endowments explaining 12 percent and 20 percent of the decline in achievement by 2019 and 2023, respectively.

Table 9: Summarized Oaxaca-Blinder decomposition results (Quintile 5)

	2011/19	**2019/21**	**2021/23**	**2019/23**	**2011/23**
Year 1	56.98	54.86	55.31	54.86	56.98
Year 2	54.86	55.31	54.29	54.29	54.29
Difference (Y1-Y2)	**2.12**	**-0.45**	**1.02**	**0.57**	**2.68**
Breakdown of difference:					
Endowments	0.25***	0.36***	-0.37***	-0.02	0.54***
	(12%)	(-78%)	(-36%)	(-3%)	(20%)
Coefficients	2.27***	-0.74***	1.44***	0.68***	2.89***
	(107%)	(162%)	(141%)	(119%)	(108%)
Interaction	-0.41***	-0.07***	-0.05***	-0.09***	-0.74***
	(-19%)	(16%)	(-5%)	(-16%)	(-28%)

*Source: Own calculations using NSC 2008-2023 data. 'Year 1' refers to the earlier year listed in the header, and a negative difference therefore signals an increase in average NSC achievement over time. Asterisks indicate statistical significance: *** p<0.01, ** p<0.05, * p<0.1*

Table 10 provides a more detailed breakdown of the overall endowment and coefficient effects, with the full decomposition results available in Tables D6-D10 (Appendix D). Variables and their individual contributions are grouped and colour-coded in the same way as in Table 7, whereby darker colours indicate a positive contribution to mean average NSC marks in the later year, lighter colours correspond to a negative contribution, and colourless cells indicate zero or statistically insignificant contributions to the difference in achievement.

Table 10: Summarized endowment and coefficient contributions (Quintile 5)

	2011/19	2019/21	2021/23	2019/23	2011/23
Difference	***2.12***	***-0.45***	***1.02***	***0.57***	***2.68***
Endowments	***0.25***	***0.36***	***-0.37***	***-0.02***	***0.54***
0 years overage	-0.20***	0.15***	-0.18***	-0.05***	-0.25***
1 year overage	0	0*	0	0	0
2 years overage	0.02***	0.05***	-0.05***	-0.01**	0.01***
3+ years overage	-0.01**	0.06***	-0.05***	0.01*	0
Missing age	0.21***	N/A	N/A	N/A	0.21***
Female	0.01***	0	0	0	0**
Provincial	0.03***	0.05***	-0.02***	0.04***	0.10***
Subject Choice	-0.05**	0.02	-0.06***	-0.01	0.17***
Language Choice	0.24***	0.03***	0.01	0.03***	0.32***
Coefficients	***2.00***	***-0.74***	***1.44***	***0.68***	***2.60***
0 years overage	1.10***	-0.52***	0.53***	-0.01	1.1***
1 year overage	0.22***	0.03	0.03*	0.06***	0.27***
2 years overage	0.04***	0.02**	-0.01**	0	0.04***
3+ years overage	0	0.01**	-0.01***	-0.01	0
Female	0.08	-0.22***	0.07	-0.15***	-0.07
Provincial	-0.27***	0.14**	-0.04	0.09	-0.17***
Subject Choice	5.27***	-2.11***	0.67*	-1.42***	3.76***
Language Choice	0.86***	-0.08	0.42***	0.35***	1.22***
Constant	-5.03***	1.99***	-0.22	1.77***	-3.26***

Source: Own calculations from Oaxaca-Blinder decomposition using NSC 2008-2023 data. Standardized life orientation mark's contribution is not shown, nor are any interaction effects. 'Provincial', 'Subject Choice', and 'Language Choice' refer to groupings of variables. Age and provincial categorical variables are normalized. *** *p<0.01,* ** *p<0.05,* * *p<0.1*

For the decrease in mean average NSC mark between 2011 and 2023 (last column, Table 10), the majority of the endowment effect was attributable to the subject and language choice variables, although the provincial distribution also moved in an unfavourable direction. Positive achievement effects did accrue from higher proportions of appropriately-aged candidates, but this was not enough to outweigh the other endowment changes' negative contributions to achievement. In terms of coefficient effects, the coefficients on subject and language choice worsened substantially between 2011 and 2023, with the combined effect close to double the overall unexplained decrease in mean average NSC mark. Coefficients on overage status also worsened, although this was partially impacted by candidates with missing ages. Unexplained improvements in unobserved factors not included in the model—reflected by the constant term—mitigated the large decrease caused by changes in other coefficients. This could possibly reflect educational quality improvements between 2011 and 2023, with the size of the improvement smaller than those seen for Quintile 1 to 3 candidates (Table 7).

The modest decline in mean average NSC mark between 2019 and 2023 (second last column, Table 10) was mainly attributable to coefficient changes, since beneficial endowment effects from an improved age profile were cancelled out by a worse provincial distribution and language subject choice in 2023. The two largest coefficient contributions were subject choice and the constant term, although their contributions were in opposite directions. The constant term's coefficient effect was 1.77, indicating a deterioration in factors outside of the model, which contributed to the decrease in average marks in Quintile 5 schools between 2019 and 2023. In contrast, subject choice had an unexplained favourable change in coefficients (contributing -1.42 to the total coefficient effect). These coefficient contributions would be consistent with negative pandemic effects—reflected by the deterioration in the constant term—and leniency in certain subjects' examinations, but they could also be the result of other unobserved changes that occurred between 2019 and 2023.

Additional insight is gained by looking at the decomposition of achievement differences for shorter and more comparable time periods. The decomposition of the 2011-2019 decrease in achievement shows that the majority of the unexplained change resulted from less favourable coefficients on subject and language choice outweighing the positive effects of improvements in factors outside of the model (indicated by 'Constant' in Table 10). Although the overall coefficient effect for 2011-2019 was similar to 2011-2023 (2.0 compared to 2.6), the magnitudes of the subject choice and constant coefficient contributions were larger in the 2011-2019 period, with each equating to more than double the overall 2011-2019 coefficient effect.

Between 2019 and 2021, the effect of the less favourable age profile of candidates was completely offset by the unexplained improvements in coefficients, resulting in the overall increase in achievement between these two years. More favourable coefficients for appropriately-aged candidates, female candidates, and for subject choice drove the total coefficient effect, although the increase in achievement was dampened by negative changes in unobserved factors outside the model. The 2019-2021 age endowment and coefficient effects were near completely reversed in the two year period that followed (2021-2023), while the deterioration in the coefficients on subject and language choice between 2021 and 2023 contributed to the decline in average NSC mark between the two years, but were not enough to outweigh the positive coefficient effects incurred between 2019 and 2021.

4.5 Summary of decomposition results by quintile

Regardless of time period and quintile group, little of the change in mean average NSC mark over time could be explained by changes in observable cohort characteristics (endowments). The 'unexplained' component of the changes in mean average achievement was influenced by various variables, so a summary of the direction of these changes is useful.

Table 11 on the next page summarizes the commonalities and differences in the Oaxaca-Blinder decomposition results of the two quintile groups. In the table, 'improvements' and 'declines' are associated with corresponding movements in achievement—an 'improvement', therefore refers to a change in the specified variable (or coefficient) which increased achievement over the specified time period, even if overall achievement declined due to other factors.

It was decided to focus on four key factors in Table 11:

1. Changes in unobserved factors outside of the model (i.e. changes to the constant term)
2. Age effects (i.e. changes in the age composition and estimated coefficients on overage status)
3. Unexplained gender effects (i.e. changes in the estimated 'female' coefficients)
4. Unexplained subject choice effects (i.e. changes in the estimated coefficients on subject choice)

These factors were chosen because of the magnitude of their contributions toward the overall changes in achievement between years, and also due to their relevance to repetition, the pandemic, and new patterns[38] that emerged during the pandemic years. Due to space constraints, not all year pairs could be shown for each factor, but colours are used in Table 11 to distinguish between time periods.

The practical implications and interpretations of the decomposition results, along with a broader discussion of overall NSC trends, will be discussed in the final section of this paper.

[38] For instance, the gender changes that occurred from 2020 onward (see Figure 5, p.19).

Table 11: Summary of key Oaxaca-Blinder decomposition findings by quintile group and time period

	Time period	Quintile 1 to 3	Quintile 5	Notes
Unobserved factors outside of the model	2011-2019	Large improvement	Very large improvement	
	2019-2021	Small improvement (statistically insignificant)	Large decline	
	2021-2023	Large improvement	Small improvement (statistically insignificant)	
	2019-2023	Large improvement	Large decline	Q1-3 improvement = double Q5 decline
	2011-2023	Very large improvement	Large improvement	Improvement Q1-3 = double Q5 improvement
Age effects	2019-2021	Worse endowments; Worse penalties for multiple-repeaters	Worse endowments; Improved returns for appropriately-aged	
	2021-2023	Better endowments; Worse returns for appropriately-aged (weakly significant at 10% level)	Better endowments; Worse returns for appropriately-aged	Net improvement in Q1-3; Net decline in Q5
	2019-2023	Net decrease in achievement: better endowments; worse returns	No change in achievement: small improvement in endowments; small deterioration in returns	2019-2023 achievement increase would be 50% higher in Q1-3 in the absence of age effects
	2011-2023	Net increase in achievement: better endowments; worse returns	Net decrease in achievement: better endowments; worse returns	Q5 coefficient effects sensitive to missing ages
Coefficient effect on gender	2019-2021	Improvement	Improvement	Improvement from smaller pro-male gap
	2019-2023	Improvement	Improvement	Q1-3 improvement = double Q5 improvement
Coefficient effect on subject choice	2019-2021	Improvement	Large improvement	Q5 improvement = four times Q1-3 improvement
	2021-2023	Decline	Decline (weakly significant at 10% level)	
	2019-2023	Decline	Large improvement	
	2011-2023	Decline	Large decline	Q1-3 decline smaller than 2019-2023; Q5 decline = double 2019-2023 Q5 improvement

Source: Summarized findings from Table 7 and Table 10. 'Improvement' and 'Decline' refer to directions of contributions to overall changes in achievement.

5. Discussion and conclusion

This paper has provided a broad overview of NSC achievement over a period spanning more than a decade, along with a more granular investigation of the underlying determinants of NSC achievement and its changes over time. This section will highlight some of the findings emerging from the analysis.

Similar to other studies, school quintile emerged as a key consideration in NSC achievement, with candidates in wealthier schools outperforming those in lower quintiles. Summary statistics of achievement by quintile indicated a reduction in inequality between Quintile 1 to 3 candidates and Quintile 5 candidates over time, and also suggested differential impacts of the pandemic. Regression analysis furthermore showed a narrowing of inequality across poorer quintiles themselves, with unexplained improvements for Quintile 1 candidates between 2021 and 2023. More contextual information is needed to explain such improvements, with one potential explanation being that candidates in poorer schools may have benefitted disproportionately from any pandemic-related catch-up programmes.

Over time, and particularly during the pandemic years, there were large shifts in the age profile of NSC cohorts. This was especially pronounced in Quintile 1 to 3 schools, where repetition rates are historically high, and changes to progression policy have the potential to greatly impact flows into Grade 12. The analysis showed that the true effect of prior repetition—as proxied by overage status—on candidates' final NSC results is difficult to determine, because the returns to overage status vary from year to year. These varying returns likely reflect unobserved fundamental changes in the overage population. For example, overage full-time NSC candidates in 2019 were likely an academically stronger subset of all overage NSC candidates, since weaker candidates would have opted to write as part-time candidates under the Multiple Examination Opportunity (MEO) (Selkirk & Wills, 2024). The opposite would be expected in 2021, since many of the overage NSC candidates in 2021 would not have reached Grade 12 in 2021 without the more lenient promotion standards at the end of 2020. These differences in the 'type' of candidates included in the overage full-time NSC population could explain why penalties for overage candidates increased between 2019 and 2021, but decreased again by 2023 when Grade 11 repetition rates (and promotion standards) had had time to move closer to their pre-pandemic levels.

The difference in age effects across quintile groups is interesting, whereby a harsher penalty was incurred by overage candidates in Quintile 5 schools. Such a finding appears counterintuitive, since Quintile 5 schools presumably have better capacity for remediation, but it might be explained by more stigma surrounding repeaters (due to the lower prevalence of overage candidates in Quintile 5 schools). It could also indicate that the low prevalence of repetition in richer schools means that overage candidates in Quintile 5 schools are distinctly academically weaker than appropriately-aged candidates (in a way not fully captured by relative life orientation achievement), which increased the achievement penalties incurred by overage candidates in these schools.

Age effects over the longer term (2011-2023) also varied by quintile group. Oaxaca-Blinder decompositions showed that the compositional benefit of younger candidates in Quintile 1 to 3 schools outweighed the effect of deteriorations in the age coefficients, while the opposite was true for Quintile 5 candidates. For Quintile 5 candidates, much of the deterioration in returns happened prior to 2019, while for Quintile 1 to 3 candidates it happened between 2019 and 2023, but was somewhat mitigated by improved age endowments over the same period. The net negative contribution of age towards achievement in Quintile 1 to 3 schools between 2019 and 2023 raises the question of which cost is greater: the decline in NSC results from improved survival rates to matric, or the costs incurred in maintaining high repetition rates in the FET phase? To answer this question would require more information on the MEO's effects in 2019, and also a more extensive examination of the costs of each policy with regard to factors like dropout risk and learners' earning potential.

Most of the discussion in this paper assumes that changes in the NSC cohorts' age profile were mainly attributable to repetition and MEO changes in the FET phase. However, it is possible that repetition changes in the years preceding the FET phase contributed to changing age profiles. This requires further study, and relates to another unexpected finding in the analysis: the much lower prevalence of multiple repetition in the 2023 NSC cohort. It is not clear if this was driven solely by pandemic-related repetition changes, but if it were, it would indicate that many learners repeating in the FET phase pre-pandemic were first- or second-time repeaters—not 'serial repeaters' repeating again as soon as repetition policy allowed for it. To investigate this, ideally longitudinal data linked to NSC results would be needed to provide the timing of candidates' repetition and subsequent overage categorization. But even a rudimentary investigation of FET repetition rates by overage status, especially during the pandemic years, could establish if many of the FET phase repeaters are indeed first- or second-time repeaters. If true, the benefit of such late repetition should urgently be investigated, given the general consensus in international literature that repetition is often less beneficial—and potentially even harmful—the later it is experienced (see, for example, Valbuena et al. (2021)).

Regarding FET phase repetition as a whole, it is possible that the financial cost savings and spillover benefits (such as reduced class sizes) that could be gained from reducing repetition would justify any declines in average NSC achievement, and perhaps even result in improved NSC achievement once 'bottlenecks' leave the system—as may have occurred in 2023. However, it is also possible that lower repetition would result in less dropout, and that the resulting large and academically heterogenous classes could cause negative impacts for both repeaters and non-repeaters. It is not possible to provide policy recommendations based on currently available information, but the results of the present study (and Selkirk (2025, Chapter 3)) suggest that repetition in the FET phase should be investigated further.

Another topic that warrants further investigation is the role of gender in NSC results. The present analysis has shown that achievement differences by gender are not accurately reflected in descriptive statistics, and that it is necessary to control for other factors such as overage status, relative life orientation achievement and subject choice in order to get a more accurate idea of the gender gap. A pro-male achievement gap (controlling for other factors) was found in both quintile groups, although the size and statistical significance of the gap differed by quintile. This was especially true for 2021, where the gender gap for Quintile 5 candidates was small and not statistically significant at a 10 percent level. Further research is required to better understand the size and reasons for the gender gap, as well as to investigate why it changed in 2021 and 2023 compared to earlier years. Given the sensitivity of the gender gap to the inclusion of the standardized LO mark, it would also be valuable for future research to corroborate if the present study's gender-related findings are accurate, or if there are nuances in standardized LO marks that are biasing the results.

The present paper sought to address the following questions:

1. What learner and school factors are associated with NSC achievement, and how have the associations changed over time?
2. How have repetition changes affected the age composition of NSC cohorts, and how has the age composition influenced NSC results post-2019?
3. How much of the change in NSC achievement over time can be explained by observable changes in cohort characteristics?
4. What are the main drivers of the unexplained changes in NSC achievement over time?

The preceding discussion has mostly addressed the first two questions, and the remaining discussion will address the third and fourth. First, however, it should be highlighted that the analysis in this paper has demonstrated the importance of controlling for factors such as province, subject and language choice, and candidate ability—the exclusion of these factors significantly influenced the estimated coefficients on other covariates such as overage status, gender, and quintile. But this analysis has also illustrated the complexities associated with including such controls: ranging from strong correlation between province and language examination variables; to challenges in obtaining a measure of subject choice and difficulty; to imperfect measures of candidate ability. These, and other challenges prevent a deterministic answer to the first research question—for individual years, or across time—but it is doubtless that relationships do exist between the aforementioned factors and NSC achievement. These relationships remain to be explored by further research which can supplement the current data with additional explanatory variables and unlock techniques such as propensity score matching to better incorporate changes in the NSC population over time.

In light of the above, it is unsurprising that the majority of the changes in mean average NSC mark over time cannot be explained by changes in observable cohort characteristics. Instead, changes in mean average NSC mark were largely driven by unexplained changes in coefficients. Provincial, subject and language choice coefficient changes were large contributors to changes in achievement over time for both quintile groups, but direct comparison across quintile groups is difficult due to differences in subject choice. Despite the subject choice differences, it is still interesting to note that both quintile groups had more favourable coefficients on subject choice variables in 2021 compared to 2019. Without further information it is difficult to explain the more favourable coefficients, although they would be consistent with leniency existing in some subjects in 2021. Alternatively, they may indicate fundamental changes in the way in which candidates sorted themselves into subjects between the two years. Regardless, the changes in returns to subject choice very strongly support previous research findings or assumptions that difficulty levels in individual subjects vary over time (Gustafsson & Taylor, 2017a; 2017b; Zondo et al., 2020; Gustafsson & Taylor, 2018; Gustafsson, 2016).

Unexplained changes in factors not included in the model—represented by the constant term in the Oaxaca-Blinder decomposition's coefficient effects—were another large contributing factor to the unexplained changes in achievement in both quintile groups. The changes in size and direction of this contribution yields two key considerations. First, it was shown that improvements in factors outside of the model were large contributors to the overall change in achievement since 2011, especially between 2011 and 2019. While some of this is likely attributable to the MEO biasing the full-time NSC cohort sample toward higher ability candidates, the main reason is likely improvements in overall education quality over time, especially in Quintile 1 to 3 schools. This argument is supported by other findings of educational quality improvements in lower grades (see, for example, Gustafsson and Taylor (2022); DBE (2023b); Gustafsson (2017)).

The second observation is that no obvious 'pandemic effect' is observed for Quintile 1 to 3 candidates, regardless of time period considered (2019-2021; 2021-2023; or 2019-2023). Only candidates in Quintile 5 schools experienced a negative change in factors outside of the model between 2019 and 2021, after which they experienced a small and statistically insignificant improvement between 2021 and 2023. In contrast, Quintile 1 to 3 candidates experienced a large improvement in factors outside the model between 2021 and 2023 and a small and statistically insignificant improvement between 2019 and 2021. Such findings are even more perplexing given local and international findings that lower-SES learners and schools were more likely to be adversely impacted by pandemic-related learning losses (for example Van der Berg et al. (2022); Ardington et al. (2021), Bohmer and Wills (2023); Maldonado and De Witte (2022), Fuller et al. (2024)).

Of course, pandemic impacts were not the only unmodelled factor in the present analysis, and they would not solely determine the constant term's contribution to changes in NSC achievement. A number of hypotheses can be presented to explain the findings. For example, educational quality improvements pre-pandemic may have been heterogenous, with bigger gains in the least resourced schools due to their greater scope for improvements. It is also possible that if the NSC standardization process failed to take into account the additional academically weaker learners, such learners—who would be disproportionately found in poorer schools, due to these schools' higher repetition rates—would have benefitted more from any unintentional grade inflation[39]. Alternatively, pandemic catch-up programmes may have disproportionately targeted (or benefitted) learners in Quintile 1 to 3 schools. And other as yet unconsidered factors could also have contributed to the constant term's coefficient effect. Unfortunately, no single hypothesis can be justified as most plausible with the current data and information.

[39] This is because these learners would have their marks adjusted upward to match previous years' achievement distributions, despite being academically weaker than learners who were in the same part of the achievement distribution in previous years.

In some ways, the preceding discussion may present more questions than answers to the stated research questions. Nevertheless, this foundational exploration of the NSC data is valuable, both in providing a long-term overview of NSC achievement and in providing preliminary insights of the multitude of dynamics at play in the upper end of the South African education system. It is unlikely that further analysis of the present dataset will yield satisfactory answers to most research questions, and it is unfortunate that such a large and complete[40] dataset cannot be used to confidently answer questions such as "what impact did the pandemic have on Grade 12 learners' academic achievement?" or "how did a halving of Grade 11 repetition rates impact NSC achievement?". There are two main reasons for this: uncertainty of the extent to which selection effects into matric occurred, and uncertainty in the comparability of NSC achievement between years.

For South Africa, and probably many other developing countries, aiming to mirror a context like Columbia (used in Alvarado et al.'s (2023) study)—which has IRT incorporated into the examination system and rich learner background information attached to school-exit examination results[41]—is unrealistic, especially in the short term. However, there are ways in which existing data can be used to make the NSC data and its accompanying research more credible and useful.

If access to the complete NSC data[42] were granted, it would be easier to gauge the extent of selection issues into matric and the expected performance of additional (or missing) learners. If matric data were linked to existing school-based assessment data, it would be easier to study and incorporate learner flows into matric, while also potentially allowing for econometric methods such as propensity score matching[43]. These suggestions would also allow for better understanding of the comparability of NSC results over time, since information on selection into matric would facilitate research aimed at predicting expected results that actual NSC achievement could be compared against. If raw NSC examination marks—marks unadjusted by the standardization process, and excluding the school-based assessment component—were made available to researchers, even better insight into the comparability of results across time could be gained, especially if coupled with some of the aforementioned additional data.

The recommendations thus far are aimed at retrospectively understanding the extent to which issues exist in the NSC mark standardization process. This is important to establish what insights the data can give into topics such as: true achievement at matric level; the pandemic's impacts on secondary school achievement; and the impacts of various repetition and progression policy changes on matric results. Further discussion of the

[40] 'Complete' here refers to the variables that were supplied in the NSC dataset that was available for study—aside from some missing data in the early years of the data for variables such as age, the data contains very little missing information or errors (author's opinion, based on own experience with and cleaning of the data). As will be discussed, the NSC data used in this study was not the 'complete' NSC data in the sense that it did not include all variables collected on NSC candidates (such as progression or repeater status).

[41] IRT provides more comparable results over time, while rich learner background information provides insight into any selection effects that may have occurred. Alvarado et al.'s (2023) study demonstrates how these features facilitated research into learning losses among school leavers during the pandemic, even with selection effects present.

[42] Specifically, NSC data that includes part-time candidates' results, and variables indicating if candidates are progressed, MEO candidates, or NSC repeaters.

[43] Additional information such as learners' performance in previous grades and their specific repetition patterns would provide extra characteristics upon which to match learners in propensity score matching.

standardization of NSC marks is provided in Selkirk (2025, Chapters 1, 3 & 5). But looking toward future NSC data and research, a final recommendation would be for more transparency to be given to researchers regarding the standardization process, and—if necessary and feasible—for compositional changes to be incorporated into the standardization process to maintain more consistent and credible standards from year to year. The standardization of results is a sensitive topic and it needs to be approached with caution. Any discussions with standardization bodies or government departments and policymakers should emphasize that investigation into the consistency of standards in past years is not aimed at criticizing or delegitimising previous NSC results, but is rather a critical step to facilitate any research involving NSC outcomes or data.

In closing, I will reiterate that analysis of NSC results is a complex undertaking, even if only examining achievement in a single year or subject. This paper has demonstrated the complexities involved when analysis is undertaken at learner-level over multiple years and subjects. It is hoped that the present research can provide future researchers with a comprehensive introduction to the National Senior Certificate examination results and provide necessary insight into the various factors that may complicate—or render impossible—their planned analysis. And it is furthermore hoped that this work will encourage collaboration between the Department of Education, Umalusi, and researchers, in order to strengthen the data itself and facilitate policy-relevant research using the NSC data.

References

Alvarado, L., Soler, S., & González, J. (2023). Gone with the pandemic: How did Covid-19 affect the academic performance of Colombian students? *International Journal of Educational Development*, *100*(2023): 102783.

Ardington, C., Wills, G. & Kotze, J. (2021). COVID-19 learning losses: Early grade reading in South Africa. *International Journal of Educational Development*, *86*(2021): 102480.

Böhmer, B. (forthcoming). *Understanding the Roles of Age, Gender, and Grade R Attendance in Academic Progression and Performance from Grades 1 to 4.* Stellenbosch: Stellenbosch University.

Böhmer, B., & Wills, G. (2023). *COVID-19 and inequality in reading outcomes in South Africa: PIRLS 2016 and 2021. COVID-Generation RESEP working paper*. Stellenbosch: Stellenbosch University.

Bridgman, G. (2020). Correspondence between mathematics and mathematical literacy scores: an analysis from 2010 to 2018. *Stellenbosch Economic Working Papers, WP03/2020.* Stellenbosch: Stellenbosch University.

Clark, R. (2012). 'Maths vs. Maths Literacy: the continuing debate', *Mail & Guardian Thought Leader*, 9 January. Available at: https://thoughtleader.co.za/maths-vs-maths-literacy-the-continuing-debate/ (accessed 20 May 2025)

Coe, R. (2010). Understanding comparability of examination standards. *Research Papers in Education*, *25*(3): 271-284.

Crouch, L., & Mabogoane, T. (1998). When the residuals matter more than the coefficients: An educational perspective. *Studies in Economics and Econometrics*, *22*(2): 1-14.

Department of Basic Education. (2012). *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12, published as Government Notices No. 1115 and 1116 in Government Gazette No. 36042.* Pretoria: Department of Basic Education.

Department of Basic Education. (2023a). *Grade promotion, repetition and dropping out 2018 to 2021* (Data Report). Pretoria: Department of Basic Education.

Department of Basic Education. (2023b). *National Senior Certificate Examination Report 2022.* Pretoria: Department of Basic Education.

Fuller, S., Swiderski, T., Mikkelsen, C., & Bastian, K. (2024). In School, Engaged, on Track? The Effect of the Pandemic on Student Attendance, Course Grades, and Grade Retention in North Carolina. *Educational Researcher, 54*(2): 78-90.

Gustafsson, M. (2016). *Understanding trends in high-level achievement in Grade 12 mathematics and physical science.* Pretoria: Department of Basic Education.

Gustafsson, M. (2017). *TIMSS, SACMEQ, PIRLS and Matric. A reconciliation of the trends*. Pretoria: Department of Basic Education / ReSEP at University of Stellenbosch.

Gustafsson, M. (2019). *A comprehensive view of full- and part-time NSC candidates 2014-2017.* Pretoria: Department of Basic Education.

Gustafsson M., & Taylor, S. (2016). *Treating schools to a new administration: Evidence from South Africa of the impact of better practices in the system-level administration of schools. Stellenbosch University Working Papers, WP05/16*. Stellenbosch: University of Stellenbosch.

Gustafsson, M. & Taylor, N. (2017a). Generation and use of data in the Western Cape in the delivery of basic education. *Report for National Treasury's Financial Management Improvement Programme (FMIP) III.* Pretoria: Department of Basic Education.

Gustafsson, M. & Taylor, N. (2017b). Optimal school-level Grade 12 performance indicators and a proposed school report card. *Report for National Treasury's Financial Management Improvement Programme (FMIP) III.* Pretoria: Department of Basic Education.

Gustafsson, M., & Taylor, S. (2018). Treating schools to a new administration: Evidence of the impact of better practices in the system-level administration of schools. *Journal of African Economies*, *27*(5): 515-537.

Gustafsson, M. & Taylor, S. (2022). *What lies behind South Africa's improvements in PIRLS? An Oaxaca-Blinder analysis of the 2011 and 2016 data. Stellenbosch Economic Working Papers, WP02/2022*. Stellenbosch: Stellenbosch University.

Hanushek, E., Light, J., Peterson, P., Talpey, L., & Woessmann, L. (2022). Long-run Trends in the U.S. SES-Achievement Gap. *Education Finance and Policy*, *17*(4): 608-640.

Jann, B. (2008). The Blinder-Oaxaca decomposition for linear regression models. *The Stata Journal, 8*(4): 453-479.

Maldonado, J., & De Witte, K. (2022). The effect of school closures on standardised student test outcomes. *British Educational Research Journal, 48*(1): 49-94.

Moodley, V., & Coetser, A. (2023). A comparative study of National Senior Certificate summative assessments of poetry for four South African official languages at Home Language proficiency. *Southern African Linguistics and Applied Language Studies*, *41*(1): 44-62.

Poquette, H., & Butler, A. (2018). *Understanding the policy context of high school exit exams: A review of the literature from 2006 to 2018. Kentucky Department of Education Working Paper.* Frankfort: Kentucky Department of Education.

Selkirk, R. (2025). Grade Repetition in South Africa: Impacts on Achievement, Flows, and School Completion. Doctoral dissertation. Stellenbosch: Stellenbosch University. [online: https://scholar.sun.ac.za/handle/10019.1/134815]

Selkirk, R., & Wills, G. (2024). *Trends in school completion and matric results before, during and after COVID-19*. Chapter in Wills, G., Selkirk, R. & Kruger, J. (ed). *School completion, the matric and post-school transitions in South Africa. A compilation of research for the COVID-Generation Project*. Stellenbosch: Stellenbosch University.

Shepherd, D. (2012). School performance: Aspects of performance in the matriculation examinations. *Public Expenditure Analysis for the Department of Basic Education, Report 9.* Stellenbosch: Oxford Policy Management Africa.

Simkins, C. (2010). *The maths and science performance of South Africa's public schools. Some lessons from the past decade.* Johannesburg: CDE.

Spaull, N. (2012). *Poverty & Privilege: Primary School Inequality in South Africa. Stellenbosch Economic Working Papers, WP13/12*. Stellenbosch: Stellenbosch University.

Spaull, N. (2016). 'Matric cracks starting to show', *Sunday Times*, 10 January. Available at: https://www.timeslive.co.za/sunday-times/opinion-and-analysis/2016-01-10-matric-cracks-starting-to-show/ (accessed 25 September 2024)

Spaull, N., & Kotze, J. (2015). Starting behind and staying behind in South Africa: The case of insurmountable learning deficits in mathematics. *International Journal of Educational Development*, *41*: 13-24.

Steinsland, M. (2020). 'OPINION: Why matric throughput rate is a better indicator of success', *news24*, 8 January. Available at: https://www.news24.com/opinion-why-matric-throughput-rate-is-a-better-indicator-of-success-20200108 (accessed 20 May 2025)

Swelindawo, L., & Taylor, S. (Forthcoming). *National Senior Certificate: Analyses in Mathematics.* Pretoria: Department of Basic Education.

Umalusi. (2014). Understanding statistical moderation. Available at: https://www.umalusi.org.za/docs/introductions/2014/intro1121.html#:~:text=Standardisation%20of%20results%20is%20achieved,case%20the%20following%20may%20occur (accessed 11 May 2025)

Umalusi. (2022a). *International Benchmarking of the South African National Senior Certificate (NSC).* Pretoria: Umalusi Quality Council for General and Further Education and Training.

Umalusi. (2022b). *Report on the Quality Assurance of the Department of Basic Education (DBE) November 2021 National Senior Certificate examinations and assessment*. Pretoria: Umalusi Quality Council for General and Further Education and Training.

Valbuena, J., Mediavilla, M., Choi, A., & Gil, M. (2021). The effects of grade retention policies: A literature review of empirical studies applying causal inference. *Journal of Economic Surveys*, *35*(2): 408-451.

Van der Berg, S. (2006). *How effective are poor schools? Poverty and educational outcomes in South Africa. Stellenbosch Economic Working Papers, WP06/2006*. Stellenbosch: University of Stellenbosch.

Van der Berg, S., Van Wyk, C., & Selkirk, R. (2020). *Schools in the time of COVID-19: Possible implications for enrolment, repetition and dropout. Stellenbosch Economic Working Papers 20/2020*. Stellenbosch University.

Van der Berg, S., Van Wyk, C., Selkirk, R., & Hofmeyr, H. (2021). *Learner flows through schools: Using high quality administrative data to understand system performance*. *RESEP research report*. Stellenbosch, Stellenbosch University.

Van der Berg, S., Hoadley, U., Galant, J., Van Wyk, C., & Bohmer, B. (2022). *Learning losses from COVID-19 in the Western Cape. Evidence from Systemic Tests. RESEP research report*. Stellenbosch: Stellenbosch University.

Van der Berg, S., Van Wyk, C., Gustafsson, M., Meyer, H., Chari, A., Van Biljon, C., Lilenstein, A., Selkirk, R., & McCallum, J. (2023). *What rich new education data can tell us. RESEP research report*. Stellenbosch: Stellenbosch University.

Van der Berg, S., Van Wyk, C., Gustafsson, M., Clayton, R., Bohmer, B., Meyer, H., Qvist, J., Mkhombo, T., Euston-Brown, A., Claassen, J., & De Gouveia, D. (2024). *What SA-SAMS and LURITS data tells us about education. New insights from administrative data. RESEP research report.* Stellenbosch: Stellenbosch University.

Van der Berg, S., Hofmeyr, H., Van Wyk, C., Böhmer, B., Clayton, R., Selkirk, R., Moses, M., Qvist, J., De Gouveia, D. & Geyer, C. (2025). *Learning pathways and system performance in South African schools. Insights from administrative data. RESEP research report.* Stellenbosch: Stellenbosch University.

Whitelaw, E., & Branson, N. (2024). *Assessment matters: What can we understand about National Senior Certificate results during COVID-19 from university entrance exams? COVID-Generation RESEP note*. Stellenbosch: Stellenbosch University.

Wills, G. (2024). *The consistency of the matric and its signalling ability – A review of the evidence.* Chapter in Wills, G., Selkirk, R. & Kruger, J. (ed). *School completion, the matric and postschool transitions in South Africa. A compilation of research for the COVID-Generation Project*. Stellenbosch: Stellenbosch University.

Zondo, N., Zewotir, T., & North, D. (2020). Learner Performance in the 2009 to 2014 Final Grade 12 Mathematics Examination: A Quantile Regression Approach. *Pythagoras*, *41*(1): a545.

Zondo, N., Zewotir, T., & North, D. (2021). The level of difficulty and discrimination power of the items of the National Senior Certificate Mathematics Examination. *South African Journal of Education*, *41*(4).

Appendix A: Cleaning and Construction of the NSC Data

The data received from the Department of Basic Education contained learner-level subject data for the years 2008-2023, consisting of a total 69,450,016 observations. 'Observation' refers to an individual data entry, of which multiple exist per NSC candidate (one observation per written subject), and 'final mark' refers to the final mark obtained in the relevant subject.

The following steps were taken in cleaning the data to arrive at the final dataset used in the present study:

- Duplicate observations (matching on all variables) were removed.
- Observations for candidates with duplicate subjects that were missing final marks were removed.
- For observations with a final mark of zero, final marks were replaced by missing values if one or more of the following conditions were met:
  - All the candidate's subjects had final marks that were missing or zero
  - The candidate's result status was missing or 'bachelors pass'
  - The candidate had non-missing and non-zero marks for at least six other subjects
- Subject count was recalculated for subjects with non-missing marks, and this was then used to identify 'full-time candidates'. 'Full-time candidates' were defined to be candidates with a non-missing result status and final marks for six or more subjects. An exception was made for NSC LSEN candidates, who were classified as 'full-time candidates' if they had a non-missing result status.
- Candidates who did not meet the requirements of being 'full-time candidates' were removed from the data.
- For the calculation of candidates' average marks, life orientation was excluded, and subjects examined by a body other than the DBE (thus containing a missing or zero final mark) were also excluded.
- Other errors of negligible size were removed at the researcher's discretion.
- After all relevant learner-level variables were created from the learner-level subject data, the data was collapsed so that each observation uniquely identified a full-time candidate. The final dataset contained 9 246 670 observations across all years and quintiles.

Appendix B: Subject and Language Choices and Descriptions

Table B1: Subject choice variables and description for Quintile 1 to 3 analysis

Variable name	2011	2019	2021	2023	Increase: 2011-2023	Increase: 2019-2023	Description of variable	Subjects in category
acc	28.2%	14.9%	14.1%	13.6%	-14.5%	-1.2%	Accounting dummy	
math	45.3%	44.2%	36.5%	37.3%	-8.0%	-6.9%	Mathematics dummy	
sci	37.3%	33.3%	28.6%	30.7%	-6.6%	-2.6%	Physical Science dummy	
cat	3.8%	2.3%	2.1%	2.3%	-1.5%	0.0%	Computer Applications Technology dummy	
commerce	0.70	0.54	0.54	0.51	-0.19	-0.04	Count of commerce subjects taken [0, 1, 2+]	Accounting, Economics, Business Studies
agri	22.0%	23.6%	23.9%	23.3%	1.3%	-0.3%	Dummy if any agricultural subjects taken	
lifesci	55.5%	59.5%	57.2%	57.4%	1.8%	-2.1%	Life Science dummy	
arts	0.9%	2.3%	2.6%	3.0%	2.1%	0.7%	Dummy if any arts subject(s) taken	Dance Studies, Design, Visual Arts, Dramatic Arts, Music
geog	43.7%	54.5%	55.2%	54.2%	10.4%	-0.3%	Geography dummy	
services	18.4%	26.7%	30.5%	33.0%	14.5%	6.3%	Dummy if any services subjects taken	Tourism, Hospitality Studies, Consumer Studies
history	18.0%	29.0%	32.3%	32.9%	14.9%	3.9%	History dummy	
tourism	15.5%	23.8%	27.9%	30.6%	15.1%	6.8%	Tourism dummy	

Table B2: Subject choice variables and description for Quintile 5 analysis

Variable name	2011	2019	2021	2023	Increase: 2011-2023	Increase: 2019-2023	Description of variable	Subjects in category
acc	25.0%	16.6%	18.4%	17.5%	-7.5%	0.9%	Accounting dummy	
math	46.6%	43.1%	38.8%	40.8%	-5.8%	-2.3%	Mathematics dummy	
cat	26.0%	18.2%	19.5%	21.6%	-4.4%	3.5%	Computer Applications Technology dummy	
egd	15.6%	14.6%	13.8%	14.0%	-1.5%	-0.6%	Engineering Graphics and Design dummy	
arts	10.6%	10.7%	9.8%	9.4%	-1.2%	-1.3%	Dummy if any arts subjects taken	
it	3.4%	2.8%	2.6%	3.1%	-0.3%	0.3%	Information Technology dummy	
consumers	12.6%	13.1%	12.4%	12.4%	-0.2%	-0.7%	Consumer Science dummy	
stem	1.08	1.00	0.94	0.98	-0.10	-0.02	Count of STEM subjects (excl math) [0, 1, 2+]	Math Paper 3, CAT, IT, Life Sci, Physical Sci, Technical Science
commerce	0.74	0.70	0.73	0.68	-0.06	-0.02	Count of commerce subjects taken [0, 1, 2+]	Accounting, Economics, Business Studies
agri	1.4%	1.8%	2.3%	2.8%	1.5%	1.1%	Dummy if any agricultural subjects taken	
geog	26.2%	34.0%	32.4%	31.5%	5.3%	-2.5%	Geography dummy	
tourism	17.3%	18.1%	22.9%	23.6%	6.3%	5.5%	Tourism dummy	
history	14.4%	25.0%	27.0%	26.5%	12.2%	1.6%	History dummy	

Table B3: Language choice rates and variable descriptions

Q1-3 language variables:	**2011**	**2019**	**2021**	**2023**	**Description of variable**
enghl	1.4%	1.7%	1.5%	1.6%	English Home Language
afrhl	2.4%	2.5%	2.1%	2.3%	Afrikaans Home Language
ndebhl	1.1%	1.0%	1.2%	1.2%	IsiNdebele Home Language
zuluhl	30.4%	29.8%	30.3%	29.7%	IsiZulu Home Language
sephl	16.4%	15.0%	14.8%	14.3%	Sepedi Home Language
sothl	6.9%	6.9%	6.9%	6.9%	Sesotho Home Language
sethl	8.0%	9.4%	9.8%	10.1%	Setswana Home Language
swathl	4.1%	3.6%	4.1%	4.0%	SiSwati Home Language
tshivhl	3.5%	3.9%	3.9%	3.4%	Tshivenda Home Language
xitshl	6.0%	6.2%	6.0%	5.6%	Xitsonga Home Language
xhohl	19.9%	20.1%	19.3%	21.1%	IsiXhosa Home Language

Q5 language variables:	**2011**	**2019**	**2021**	**2023**	**Description of variable**
enghl	61.4%	69.8%	71.2%	71.5%	English Home Language
afrhl	35.1%	25.5%	22.2%	21.9%	Afrikaans Home Language
zulufal	8.2%	9.0%	9.9%	10.0%	IsiZulu First Additional Language

Table B4: Provincial share of full-time candidates

Quintile 1-3:	**2011**	**2019**	**2021**	**2023**
Eastern Cape	16.4%	16.0%	16.0%	17.3%
Free State	5.7%	5.4%	5.5%	5.6%
Gauteng	9.5%	10.8%	10.0%	10.1%
KwaZulu-Natal	25.4%	24.3%	24.7%	23.9%
Limpopo	20.6%	19.8%	19.7%	17.9%
Mpumalanga	12.1%	11.2%	12.0%	12.1%
North West	4.4%	6.0%	6.5%	6.8%
Northern Cape	1.8%	1.6%	1.6%	1.7%
Western Cape	4.0%	4.9%	4.0%	4.6%
Total candidates	*323,315*	*320,872*	*490,423*	*469,113*

Quintile 5:	**2011**	**2019**	**2021**	**2023**
Eastern Cape	7.3%	5.8%	5.5%	5.8%
Free State	6.3%	5.5%	4.7%	4.2%
Gauteng	29.5%	36.2%	38.4%	38.0%
KwaZulu-Natal	22.6%	19.8%	20.0%	19.6%
Limpopo	3.5%	2.9%	2.9%	3.0%
Mpumalanga	4.2%	2.7%	2.4%	2.5%
North West	1.7%	1.0%	0.9%	0.9%
Northern Cape	2.4%	2.2%	2.3%	2.4%
Western Cape	22.6%	24.0%	23.0%	23.7%
Total candidates	*77,895*	*95,732*	*106,190*	*107,120*

Table B5: Age, gender, and quintile share of full-time candidates

Quintile 1-3:	**2011**	**2019**	**2021**	**2023**
0 years overage	31.1%	44.3%	39.1%	49.9%
1 year overage	21.2%	23.1%	22.3%	22.3%
2 years overage	15.0%	15.1%	16.6%	12.9%
3+ years overage	20.5%	17.5%	21.9%	14.9%
Missing age	12.3%	0.0%	0.0%	0.0%
Female	53.2%	55.7%	55.2%	56.6%
Q1	30.6%	32.0%	31.9%	32.4%
Q2	32.9%	32.6%	32.4%	31.8%
Q3	36.5%	35.4%	35.6%	35.8%
Candidate numbers	323,315	320,872	490,423	469,113

Quintile 5:	**2011**	**2019**	**2021**	**2023**
0 years overage	72.6%	77.1%	74.2%	78.1%
1 year overage	17.3%	17.0%	17.8%	16.1%
2 years overage	4.0%	4.5%	5.7%	4.3%
3+ years overage	1.5%	1.4%	2.3%	1.5%
Missing age	4.6%	0.0%	0.0%	0.0%
Female	53.5%	55.1%	54.8%	54.9%
Candidate numbers	77,895	95,732	106,190	107,120

Appendix C: Full OLS Regression Output

Table C1: Full regression output for candidates' average NSC mark in 2019 (Quintile 1 to 3)

Outcome: Average mark	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) FE
1 year overage	-4.724***	-4.950***	-4.694***	-3.143***	-2.769***
	(0.044)	(0.044)	(0.044)	(0.037)	(0.041)
2 years overage	-7.011***	-7.372***	-7.012***	-4.702***	-4.107***
	(0.050)	(0.049)	(0.049)	(0.042)	(0.052)
3+ years overage	-8.996***	-9.412***	-8.976***	-6.321***	-5.517***
	(0.048)	(0.049)	(0.049)	(0.042)	(0.063)
Female		-1.976***	-1.907***	-2.629***	-2.625***
		(0.036)	(0.035)	(0.029)	(0.037)
Quintile 2		1.039***	0.768***	0.685***	
		(0.043)	(0.044)	(0.036)	
Quintile 3		0.897***	0.708***	0.682***	
		(0.044)	(0.044)	(0.037)	
Standardized LO mark				5.770***	5.989***
				(0.017)	(0.034)
Province: FS		1.920***	1.857***	1.343***	
		(0.078)	(0.131)	(0.110)	
GP		0.269***	-0.081	-0.314***	
		(0.068)	(0.108)	(0.091)	
KZ		0.446***	0.477***	0.485***	
		(0.057)	(0.115)	(0.097)	
LP		-1.941***	-2.540***	-2.649***	
		(0.059)	(0.140)	(0.118)	
MP		-1.030***	-2.761***	-2.601***	
		(0.071)	(0.131)	(0.111)	
NW		1.090***	0.370***	-0.156	
		(0.076)	(0.135)	(0.115)	
NC		-2.478***	-2.132***	-2.564***	
		(0.136)	(0.155)	(0.128)	
WC		-2.186***	-1.175***	-1.588***	
		(0.089)	(0.096)	(0.079)	
Tech student		-1.969***	-3.469***	-3.095***	-0.151
		(0.104)	(0.151)	(0.126)	(0.388)
math			-1.023***	-2.422***	-2.327***
			(0.062)	(0.052)	(0.096)
sci			2.542***	0.734***	1.012***
			(0.081)	(0.068)	(0.146)
lifesci			-0.519***	-1.197***	-0.808***
			(0.061)	(0.051)	(0.131)
cat			-0.968***	-0.951***	-0.944***
			(0.115)	(0.096)	(0.217)
geog			-0.591***	-0.829***	-0.207*
			(0.062)	(0.052)	(0.125)
history			0.089	0.038	1.037***
			(0.084)	(0.070)	(0.168)
geog × history			0.113	0.228***	0.223
			(0.085)	(0.072)	(0.154)

agri			-1.708***	-1.718***	-0.386***
			(0.061)	(0.051)	(0.130)
arts			-0.852***	-0.901***	1.696***
			(0.121)	(0.102)	(0.261)
tourism			1.650***	1.372***	1.985***
			(0.094)	(0.079)	(0.178)
services			-1.690***	-1.358***	-0.330*
			(0.099)	(0.083)	(0.190)
acc			0.067	-0.657***	-0.061
			(0.093)	(0.078)	(0.154)
1 commerce subject			-1.162***	-1.525***	-1.476***
			(0.068)	(0.057)	(0.144)
2+ commerce subjects			-1.978***	-3.049***	-2.133***
			(0.106)	(0.089)	(0.233)
acc × 1 commerce			3.512***	3.548***	2.966***
			(0.188)	(0.157)	(0.313)
enghl			-1.565***	-1.810***	-4.013***
			(0.146)	(0.125)	(0.404)
afrhl			-3.408***	-3.716***	-3.951***
			(0.116)	(0.093)	(0.671)
ndebhl			3.610***	3.862***	0.441
			(0.199)	(0.171)	(0.383)
zuluhl			-0.147	-0.169*	-1.640***
			(0.107)	(0.091)	(0.209)
sephl			-0.686***	-0.416***	-1.591***
			(0.133)	(0.111)	(0.277)
sothl			-0.380***	-0.197*	-1.103***
			(0.122)	(0.102)	(0.178)
sethl			0.645***	0.713***	-0.978***
			(0.120)	(0.101)	(0.218)
swathl			3.222***	3.544***	-1.236
			(0.158)	(0.132)	(0.851)
tshivhl			3.842***	4.011***	1.099***
			(0.155)	(0.131)	(0.358)
xitshl			0.380***	0.309***	-0.242
			(0.140)	(0.118)	(0.323)
Constant	50.648***	51.660***	53.039***	54.451***	52.913***
	(0.028)	(0.064)	(0.148)	(0.123)	(0.357)
Observations	320,867	320,867	320,867	320,861	320,861
R-squared	0.116	0.139	0.167	0.420	0.467

Robust standard errors in parentheses. The reference category is appropriately-aged male candidates in Quintile 1 schools in the Eastern Cape writing the isiXhosa Home Language examination and no commerce subjects. Subjects refer to dummies, and interaction effects are indicated with the "×" symbol.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table C2: Full regression output for candidates' average NSC mark in various years (Quintile 1 to 3)

Outcome: Average mark	(1) 2011	(2) 2019	(3) 2021	(4) 2023
1 year overage	-3.177***	-3.143***	-3.863***	-3.453***
	(0.040)	(0.037)	(0.033)	(0.032)
2 years overage	-4.753***	-4.702***	-6.090***	-5.196***
	(0.044)	(0.042)	(0.036)	(0.039)
3+ years overage	-6.722***	-6.322***	-8.593***	-6.858***
	(0.041)	(0.042)	(0.036)	(0.039)
Missing age	-4.132***	-7.656***	-2.009	-0.410***
	(0.051)	(2.818)	(2.462)	(0.073)
Female	-2.213***	-2.630***	-2.079***	-2.063***
	(0.028)	(0.029)	(0.025)	(0.026)
Quintile 2	0.767***	0.685***	0.550***	0.187***
	(0.035)	(0.036)	(0.031)	(0.032)
Quintile 3	0.879***	0.682***	0.411***	-0.112***
	(0.036)	(0.037)	(0.032)	(0.032)
Standardized LO mark	5.030***	5.770***	6.398***	6.862***
	(0.017)	(0.017)	(0.015)	(0.015)
Province: FS	2.621***	1.343***	2.495***	1.693***
	(0.112)	(0.110)	(0.094)	(0.097)
GP	2.697***	-0.314***	-0.259***	-1.274***
	(0.095)	(0.091)	(0.080)	(0.083)
KZ	3.035***	0.485***	1.193***	2.704***
	(0.102)	(0.097)	(0.087)	(0.090)
LP	2.197***	-2.649***	-1.828***	0.162
	(0.120)	(0.118)	(0.101)	(0.105)
MP	-0.326***	-2.601***	-2.155***	-3.405***
	(0.115)	(0.111)	(0.097)	(0.099)
NW	4.054***	-0.156	-0.590***	-0.860***
	(0.123)	(0.115)	(0.096)	(0.100)
NC	-0.793***	-2.564***	-2.621***	-3.322***
	(0.120)	(0.128)	(0.107)	(0.108)
WC	1.714***	-1.588***	-0.796***	-2.326***
	(0.080)	(0.079)	(0.070)	(0.069)
Tech student	-0.759***	-3.096***	-2.031***	-1.688***
	(0.127)	(0.126)	(0.109)	(0.110)
math	-1.821***	-2.422***	-1.646***	-2.462***
	(0.040)	(0.052)	(0.049)	(0.055)
sci	-1.052***	0.734***	-0.171***	-0.240***
	(0.064)	(0.068)	(0.062)	(0.067)
lifesci	-1.467***	-1.197***	-1.006***	-1.521***
	(0.054)	(0.051)	(0.043)	(0.045)
cat	-0.583***	-0.951***	-0.969***	-1.617***
	(0.080)	(0.096)	(0.087)	(0.087)
geog	-0.902***	-0.829***	-1.445***	-0.631***
	(0.053)	(0.052)	(0.045)	(0.046)
history	-0.599***	0.038	0.179***	-0.806***
	(0.084)	(0.070)	(0.059)	(0.059)
geog × history	-0.398***	0.229***	0.296***	0.058
	(0.085)	(0.072)	(0.060)	(0.059)

agri	-1.294***	-1.717***	-1.245***	-1.397***
	(0.052)	(0.051)	(0.044)	(0.045)
arts	1.209***	-0.901***	-0.089	0.220***
	(0.145)	(0.102)	(0.081)	(0.078)
tourism	0.700***	1.372***	1.325***	0.785***
	(0.082)	(0.079)	(0.073)	(0.078)
services	0.013	-1.358***	-0.797***	-1.381***
	(0.084)	(0.083)	(0.076)	(0.082)
acc	-0.722***	-0.657***	-0.252***	-0.307***
	(0.084)	(0.078)	(0.067)	(0.071)
1 commerce subject	-1.038***	-1.525***	-0.773***	-1.291***
	(0.066)	(0.057)	(0.047)	(0.049)
2+ commerce subjects	-2.341***	-3.048***	-2.151***	-2.611***
	(0.108)	(0.089)	(0.076)	(0.080)
acc × 1 commerce	1.758***	3.547***	2.505***	2.765***
	(0.174)	(0.157)	(0.140)	(0.134)
enghl	0.675***	-1.810***	-1.407***	-4.189***
	(0.151)	(0.125)	(0.110)	(0.110)
afrhl	-1.091***	-3.716***	-4.348***	-5.653***
	(0.098)	(0.093)	(0.085)	(0.085)
ndebhl	2.681***	3.862***	3.211***	1.693***
	(0.168)	(0.171)	(0.145)	(0.149)
zuluhl	-0.452***	-0.169*	-0.700***	-0.267***
	(0.097)	(0.091)	(0.081)	(0.085)
sephl	-0.957***	-0.416***	-0.815***	-1.640***
	(0.115)	(0.111)	(0.097)	(0.100)
sothl	-0.306***	-0.197*	-0.986***	-1.394***
	(0.104)	(0.102)	(0.087)	(0.090)
sethl	-0.109	0.713***	0.071	-0.807***
	(0.104)	(0.101)	(0.087)	(0.090)
swathl	3.784***	3.545***	1.993***	2.956***
	(0.132)	(0.132)	(0.113)	(0.116)
tshivhl	1.404***	4.011***	1.962***	-0.400***
	(0.136)	(0.131)	(0.112)	(0.119)
xitshl	0.077	0.309***	-0.308***	-1.811***
	(0.120)	(0.118)	(0.103)	(0.106)
Constant	48.660***	54.451***	54.272***	57.076***
	(0.131)	(0.123)	(0.106)	(0.107)
Observations	323,315	320,866	490,423	469,110
R-squared	0.381	0.420	0.465	0.460

Robust standard errors in parentheses. The reference category is appropriately-aged male candidates in Quintile 1 schools in the Eastern Cape writing the isiXhosa Home Language examination and no commerce subjects. Subjects refer to dummies, and interaction effects are indicated with the “×” symbol.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table C3: Reduced regression output for candidates' average NSC mark in various years (Quintile 1 to 3) excluding standardized life orientation mark

Outcome: Average mark	(1) 2011	(2) 2019	(3) 2021	(4) 2023
1 year overage	-4.644***	-4.694***	-5.868***	-5.548***
	(0.047)	(0.044)	(0.040)	(0.039)
2 years overage	-6.956***	-7.012***	-9.203***	-8.281***
	(0.050)	(0.049)	(0.042)	(0.047)
3+ years overage	-9.728***	-8.976***	-12.704***	-10.299***
	(0.046)	(0.049)	(0.041)	(0.048)
Missing age	-6.087***	-10.884***	-4.330*	-7.740***
	(0.060)	(2.581)	(2.604)	(1.297)
Female	-1.659***	-1.907***	-1.083***	-0.872***
	(0.033)	(0.035)	(0.030)	(0.032)
Quintile 2	0.748***	0.768***	0.579***	0.238***
	(0.041)	(0.044)	(0.038)	(0.040)
Quintile 3	0.773***	0.708***	0.401***	-0.128***
	(0.042)	(0.044)	(0.038)	(0.040)
Constant	48.228***	53.039***	53.750***	55.556***
	(0.152)	(0.148)	(0.127)	(0.131)
Observations	323,315	320,872	490,423	469,113
R-squared	0.162	0.167	0.220	0.175
Controls:				
Province	X	X	X	X
Tech student	X	X	X	X
Subject choice	X	X	X	X
Year	2011	2019	2021	2023
Sample	Q1-3	Q1-3	Q1-3	Q1-3

Robust standard errors in parentheses. The reference category is appropriately aged male candidates in Quintile 1 schools. Candidates in the "missing age" category are negligible in all years except 2011.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table C4: Full regression output for candidates' average NSC mark in 2019 (Quintile 5)

Outcome: Average mark	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) FE
1 year overage	-7.998***	-7.710***	-5.598***	-4.266***	-2.634***
	(0.095)	(0.095)	(0.090)	(0.081)	(0.081)
2 years overage	-13.968***	-13.477***	-10.417***	-8.127***	-4.507***
	(0.137)	(0.140)	(0.142)	(0.129)	(0.157)
3+ years overage	-16.057***	-15.579***	-12.935***	-10.556***	-5.797***
	(0.243)	(0.250)	(0.254)	(0.226)	(0.348)
Female		1.588***	1.600***	-0.461***	-0.622***
		(0.077)	(0.074)	(0.067)	(0.082)
Standardized LO mark				5.944***	6.913***
				(0.036)	(0.071)
Province: FS		-1.270***	-1.265***	-1.642***	
		(0.212)	(0.195)	(0.169)	
GP		-1.958***	-1.476***	-1.794***	
		(0.159)	(0.151)	(0.129)	
KZ		-2.224***	-2.046***	-2.240***	
		(0.170)	(0.172)	(0.148)	
LP		-0.620**	-0.838***	-0.706***	
		(0.246)	(0.231)	(0.194)	
MP		-0.652**	-0.351	-0.710***	
		(0.266)	(0.246)	(0.209)	
NW		1.817***	1.410***	1.129***	
		(0.378)	(0.338)	(0.283)	
NC		-0.877***	-0.558**	-1.195***	
		(0.275)	(0.262)	(0.228)	
WC		0.511***	0.648***	0.408***	
		(0.170)	(0.159)	(0.138)	
Tech student		-5.715***	-6.573***	-7.316***	-1.828***
		(0.161)	(0.220)	(0.193)	(0.364)
egd			0.900***	0.974***	0.112
			(0.159)	(0.139)	(0.172)
math			3.315***	0.581***	-2.524***
			(0.187)	(0.165)	(0.193)
1 non-math stem			0.723***	-0.577***	-0.763***
			(0.140)	(0.125)	(0.160)
2+ non-math stem			0.794***	-2.086***	-1.263***
			(0.281)	(0.250)	(0.304)
math × 1 stem			2.090***	1.970***	1.304***
			(0.210)	(0.184)	(0.200)
math × 2+ stem			3.351***	2.453***	2.672***
			(0.265)	(0.234)	(0.256)
cat			-0.565***	0.900***	0.373***
			(0.107)	(0.095)	(0.124)
geog			-1.263***	-1.428***	-0.598***
			(0.136)	(0.119)	(0.161)
history			2.275***	1.798***	1.753***
			(0.146)	(0.128)	(0.168)
geog × history			-0.802***	-1.187***	0.224
			(0.169)	(0.151)	(0.198)

it			4.432***	4.814***	2.174***
			(0.255)	(0.217)	(0.269)
consumers			-0.169	0.184	-0.085
			(0.139)	(0.122)	(0.171)
tourism			1.011***	1.107***	2.422***
			(0.142)	(0.124)	(0.181)
agri			-2.692***	-3.041***	-1.710***
			(0.298)	(0.249)	(0.602)
arts			5.412***	5.337***	2.328***
			(0.160)	(0.141)	(0.176)
acc			3.288***	2.365***	2.165***
			(0.196)	(0.171)	(0.228)
1 commerce subject			-1.478***	-2.479***	-2.239***
			(0.134)	(0.119)	(0.167)
2+ commerce subjects			-2.441***	-4.671***	-3.090***
			(0.253)	(0.222)	(0.307)
acc × 1 commerce			3.807***	3.842***	2.008***
			(0.254)	(0.221)	(0.282)
enghl			-3.089***	-3.024***	-1.244***
			(0.084)	(0.074)	(0.302)
zulufal			0.542***	1.537***	2.771***
			(0.136)	(0.118)	(0.219)
Constant	57.075***	57.512***	55.019***	59.486***	57.419***
	(0.045)	(0.156)	(0.369)	(0.324)	(0.433)
Observations	95,732	95,732	95,732	95,732	95,732
R-squared	0.116	0.138	0.282	0.444	0.510

Robust standard errors in parentheses. The reference category is appropriately-aged male candidates in the Eastern Cape with no commerce subjects and no non-mathematics STEM subjects. Subjects refer to dummies, and interaction effects are indicated with the "×" symbol.
*** p<0.01, ** p<0.05, * p<0.1

Table C5: Full regression output for candidates' average NSC mark in various years (Quintile 5)

Outcome: Average mark	(1) 2011	(2) 2019	(3) 2021	(4) 2023
1 year overage	-4.382***	-4.266***	-5.119***	-4.652***
	(0.094)	(0.081)	(0.081)	(0.081)
2 years overage	-8.704***	-8.127***	-9.165***	-8.156***
	(0.160)	(0.129)	(0.118)	(0.132)
3+ years overage	-11.824***	-10.556***	-11.758***	-10.221***
	(0.249)	(0.226)	(0.176)	(0.218)
Missing age	-5.147***		-0.380**	
	(0.186)		(0.183)	
Female	-0.311***	-0.461***	-0.059	-0.180***
	(0.080)	(0.067)	(0.065)	(0.065)
Standardized LO mark	5.544***	5.944***	6.288***	6.522***
	(0.042)	(0.036)	(0.037)	(0.036)
Province: FS	-0.064	-1.642***	-1.473***	0.341*
	(0.190)	(0.169)	(0.181)	(0.180)
GP	-0.452***	-1.794***	-2.700***	-2.048***
	(0.144)	(0.129)	(0.129)	(0.127)
KZ	-3.047***	-2.240***	-3.182***	-2.414***
	(0.164)	(0.148)	(0.148)	(0.144)
LP	-0.039	-0.706***	-0.802***	-0.368*
	(0.209)	(0.194)	(0.200)	(0.197)
MP	-0.234	-0.710***	-1.121***	-0.340
	(0.212)	(0.209)	(0.211)	(0.210)
NW	3.054***	1.129***	-0.516*	-0.189
	(0.269)	(0.283)	(0.294)	(0.294)
NC	-0.980***	-1.195***	-1.834***	-2.213***
	(0.247)	(0.228)	(0.214)	(0.205)
WC	-0.640***	0.408***	-0.117	0.107
	(0.152)	(0.138)	(0.139)	(0.137)
Tech student	-2.786***	-7.316***	-7.122***	-5.948***
	(0.157)	(0.193)	(0.197)	(0.186)
egd	2.903***	0.974***	1.779***	1.785***
	(0.138)	(0.139)	(0.133)	(0.131)
math	1.011***	0.581***	1.685***	1.281***
	(0.179)	(0.165)	(0.168)	(0.172)
1 non-math stem	1.381***	-0.577***	0.533***	0.318***
	(0.132)	(0.125)	(0.117)	(0.112)
2+ non-math stem	1.692***	-2.086***	0.042	-0.393*
	(0.239)	(0.250)	(0.245)	(0.232)
math × 1 stem	0.477**	1.970***	1.102***	0.695***
	(0.205)	(0.184)	(0.193)	(0.196)
math × 2+ stem	1.796***	2.453***	0.283	0.270
	(0.238)	(0.234)	(0.245)	(0.237)
cat	0.292***	0.900***	0.811***	0.924***
	(0.094)	(0.095)	(0.093)	(0.089)
geog	-0.036	-1.428***	-2.066***	-1.348***
	(0.124)	(0.119)	(0.114)	(0.111)
history	2.965***	1.798***	1.361***	-0.157
	(0.150)	(0.128)	(0.121)	(0.118)

geog × history	-0.861***	-1.187***	-0.630***	-0.283*
	(0.232)	(0.151)	(0.148)	(0.146)
it	3.299***	4.814***	5.882***	6.659***
	(0.226)	(0.217)	(0.228)	(0.207)
consumers	2.670***	0.184	0.614***	1.068***
	(0.130)	(0.122)	(0.121)	(0.118)
tourism	2.545***	1.107***	1.418***	1.090***
	(0.128)	(0.124)	(0.113)	(0.107)
agri	-2.059***	-3.041***	-0.650***	-0.559***
	(0.330)	(0.249)	(0.222)	(0.196)
arts	7.542***	5.337***	5.739***	5.576***
	(0.144)	(0.141)	(0.139)	(0.136)
acc	1.980***	2.365***	2.366***	2.344***
	(0.193)	(0.171)	(0.158)	(0.164)
1 commerce subject	0.589***	-2.479***	-0.231**	-0.565***
	(0.120)	(0.119)	(0.112)	(0.108)
2+ commerce subjects	-0.749***	-4.671***	-2.185***	-2.406***
	(0.247)	(0.222)	(0.210)	(0.208)
acc × 1 commerce	1.391***	3.842***	2.078***	2.103***
	(0.241)	(0.221)	(0.211)	(0.218)
enghl	-1.751***	-3.024***	-2.855***	-3.683***
	(0.083)	(0.074)	(0.073)	(0.072)
zulufal	1.211***	1.537***	1.107***	2.790***
	(0.144)	(0.118)	(0.114)	(0.108)
Constant	55.393***	59.486***	58.746***	57.773***
	(0.312)	(0.324)	(0.302)	(0.292)
Observations	77,895	95,732	106,190	107,120
R-squared	0.400	0.444	0.457	0.442

Robust standard errors in parentheses. The reference category is appropriately-aged male candidates in the Eastern Cape with no commerce subjects and no non-mathematics STEM subjects. Subjects refer to dummies, and interaction effects are indicated with the "×" symbol.
*** p<0.01, ** p<0.05, * p<0.1

Table C6: Reduced regression output for candidates' average NSC mark in various years (Quintile 5) excluding standardized life orientation mark

Outcome: Average mark	(1) 2011	(2) 2019	(3) 2021	(4) 2023
1 year overage	-5.629***	-5.598***	-6.667***	-6.368***
	(0.104)	(0.090)	(0.092)	(0.091)
2 years overage	-10.759***	-10.417***	-11.766***	-10.946***
	(0.170)	(0.142)	(0.132)	(0.145)
3+ years overage	-14.286***	-12.935***	-14.907***	-13.257***
	(0.276)	(0.254)	(0.198)	(0.244)
Missing age	-6.078***		-4.898***	
	(0.206)		(0.201)	
Female	1.889***	1.600***	2.090***	1.798***
	(0.086)	(0.074)	(0.073)	(0.073)
Constant	51.533***	55.019***	54.760***	54.127***
	(0.348)	(0.369)	(0.349)	(0.337)
Observations	77,895	95,732	106,190	107,120
R-squared	0.256	0.282	0.296	0.259
Controls:				
Province	X	X	X	X
Tech student	X	X	X	X
Subject choice	X	X	X	X
Year	2011	2019	2021	2023
Sample	Q5	Q5	Q5	Q5

Robust standard errors in parentheses. The reference category is appropriately aged male candidates. Candidates in the "missing age" category are negligible in 2021.
*** p<0.01, ** p<0.05, * p<0.1

Appendix D: Full Oaxaca-Blinder Decomposition Output

Table D1: Full Oaxaca-Blinder decomposition results for 2011-2019 (Quintile 1 to 3)

Outcome:		CONTRIBUTIONS:		
Average mark	Overall	Endowments	Coefficients	Interaction
2011	42.742***			
	(0.018)			
2019	46.925***			
	(0.019)			
Difference	-4.183***			
	(0.026)			
Endowments	-1.178***			
	(0.347)			
Coefficients	-3.395***			
	(0.023)			
Interaction	0.390			
	(0.347)			
0 years overage		-0.577***	-0.269	0.080
		(0.075)	(0.250)	(0.075)
1 year overage		-0.023**	-0.148	0.012
		(0.011)	(0.130)	(0.011)
2 years overage		0.001	-0.100	0.001
		(0.001)	(0.086)	(0.001)
3+ years overage		-0.059***	-0.176*	-0.030*
		(0.017)	(0.099)	(0.017)
Missing age		-0.405	0.000	0.359
		(0.278)	(0.000)	(0.278)
Female		0.066***	0.232***	-0.010***
		(0.003)	(0.023)	(0.001)
Quintile 1		0.007***	-0.030***	0.001***
		(0.001)	(0.010)	(0.000)
Quintile 2		0.001***	-0.004	-0.000
		(0.000)	(0.009)	(0.000)
Quintile 3		0.003***	0.037***	0.001***
		(0.000)	(0.010)	(0.000)
Standardized LO mark		0.002	0.000	-0.000
		(0.014)	(0.001)	(0.002)
EC		0.004***	-0.414***	-0.010***
		(0.001)	(0.016)	(0.002)
FS		0.006***	-0.071***	-0.004***
		(0.001)	(0.006)	(0.001)
GP		-0.007***	0.046***	-0.006***
		(0.001)	(0.007)	(0.001)
KZ		0.015***	-0.008	-0.000
		(0.002)	(0.021)	(0.001)
LP		-0.015***	0.448***	0.019***
		(0.002)	(0.021)	(0.002)

MP	-0.016***	-0.034***	-0.003***
	(0.001)	(0.011)	(0.001)
NW	-0.012***	0.098***	-0.025***
	(0.001)	(0.007)	(0.002)
NC	-0.004***	-0.013***	-0.002***
	(0.001)	(0.002)	(0.000)
WC	0.006***	0.035***	-0.006***
	(0.001)	(0.006)	(0.001)
Tech student	0.024***	0.060***	-0.018***
	(0.001)	(0.005)	(0.002)
math	-0.027***	0.265***	0.007***
	(0.003)	(0.029)	(0.001)
sci	0.029***	-0.595***	-0.072***
	(0.003)	(0.031)	(0.004)
lifesci	0.047***	-0.161***	0.011***
	(0.002)	(0.044)	(0.003)
cat	-0.014***	0.008***	0.006***
	(0.002)	(0.003)	(0.002)
geog	0.089***	-0.040	0.008
	(0.006)	(0.040)	(0.008)
history	-0.004	-0.185***	0.070***
	(0.008)	(0.032)	(0.012)
geog × history	-0.017***	-0.135***	0.046***
	(0.005)	(0.024)	(0.008)
agri	0.027***	0.100***	-0.007***
	(0.002)	(0.017)	(0.001)
arts	0.013***	0.049***	-0.030***
	(0.001)	(0.004)	(0.003)
tourism	-0.113***	-0.160***	0.056***
	(0.007)	(0.027)	(0.009)
services	0.112***	0.366***	-0.113***
	(0.007)	(0.032)	(0.010)
acc	-0.087***	-0.010	-0.009
	(0.010)	(0.017)	(0.015)
1 commerce subject	0.074***	0.072***	-0.024***
	(0.003)	(0.013)	(0.004)
2+ commerce subjects	-0.307***	0.140***	0.071***
	(0.010)	(0.028)	(0.014)
acc × 1 commerce	-0.017***	-0.034***	0.009***
	(0.001)	(0.004)	(0.001)
enghl	0.006***	0.043***	-0.009***
	(0.001)	(0.003)	(0.001)
afrhl	0.004***	0.066***	-0.003***
	(0.001)	(0.003)	(0.001)
ndebhl	0.006***	-0.012***	-0.002***
	(0.001)	(0.002)	(0.000)
zuluhl	-0.001*	-0.084**	-0.002**
	(0.001)	(0.040)	(0.001)
sephl	-0.006***	-0.081***	-0.008***
	(0.002)	(0.024)	(0.002)
sothl	0.000	-0.008	0.000
	(0.000)	(0.010)	(0.000)

sethl		-0.010***	-0.077***	0.012***
		(0.002)	(0.014)	(0.002)
swathl		0.020***	0.009	0.001
		(0.002)	(0.007)	(0.001)
tshivhl		-0.017***	-0.102***	0.011***
		(0.002)	(0.007)	(0.001)
xitshl		-0.001**	-0.014	0.000
		(0.000)	(0.010)	(0.000)
Constant			-2.507***	
			(0.593)	
Observations	644,181	644,181	644,181	644,181

Robust standard errors in parentheses. Age, quintile and province categorical variables are normalized. Results are obtained using the -oaxaca- package in Stata 18.
*** p<0.01, ** p<0.05, * p<0.1

Table D2: Full Oaxaca-Blinder decomposition results for 2019-2021 (Quintile 1 to 3)

Outcome:		CONTRIBUTIONS:		
Average mark	Overall	Endowments	Coefficients	Interaction
2019	46.925***			
	(0.019)			
2021	46.369***			
	(0.017)			
Difference	0.556***			
	(0.025)			
Endowments	0.215***			
	(0.018)			
Coefficients	0.474***			
	(0.019)			
Interaction	-0.132***			
	(0.006)			
0 years overage		0.214***	0.099	0.013
		(0.026)	(0.293)	(0.039)
1 year overage		0.002	0.217	0.007
		(0.004)	(0.167)	(0.006)
2 years overage		0.029***	0.273**	-0.024**
		(0.007)	(0.125)	(0.011)
3+ years overage		0.201***	0.554***	-0.113***
		(0.022)	(0.164)	(0.034)
Missing age		-0.000	-0.000	0.000
		(0.000)	(0.000)	(0.000)
Female		-0.010***	-0.304***	-0.003***
		(0.002)	(0.021)	(0.001)
Quintile 1		-0.000	-0.043***	-0.000
		(0.000)	(0.009)	(0.000)
Quintile 2		0.000	-0.000	-0.000
		(0.000)	(0.009)	(0.000)
Quintile 3		-0.000**	0.048***	-0.000**
		(0.000)	(0.010)	(0.000)
Standardized LO mark		0.000	0.000	-0.000
		(0.014)	(0.001)	(0.001)

EC	0.000	0.062***	0.000
	(0.000)	(0.015)	(0.000)
FS	-0.003**	-0.042***	0.001**
	(0.002)	(0.006)	(0.000)
GP	0.002***	0.033***	0.003***
	(0.000)	(0.006)	(0.001)
KZ	-0.006***	-0.079***	0.001***
	(0.002)	(0.020)	(0.000)
LP	-0.001	-0.086***	-0.000
	(0.001)	(0.019)	(0.000)
MP	0.013***	-0.007	0.000
	(0.001)	(0.011)	(0.001)
NW	0.000	0.054***	-0.004***
	(0.000)	(0.006)	(0.001)
NC	0.001	0.007***	-0.000
	(0.001)	(0.002)	(0.000)
WC	-0.003***	-0.016***	-0.004***
	(0.001)	(0.004)	(0.001)
Tech student	-0.001	-0.027***	-0.000
	(0.001)	(0.004)	(0.000)
math	-0.127***	-0.283***	-0.060***
	(0.004)	(0.026)	(0.006)
sci	-0.008***	0.259***	0.042***
	(0.003)	(0.026)	(0.004)
lifesci	-0.023***	-0.109***	-0.004***
	(0.001)	(0.038)	(0.002)
cat	-0.002***	0.000	0.000
	(0.000)	(0.003)	(0.000)
geog	0.010***	0.340***	-0.004***
	(0.002)	(0.038)	(0.001)
history	-0.006***	-0.045	0.005
	(0.002)	(0.030)	(0.003)
geog × history	-0.006***	-0.016	0.001
	(0.001)	(0.022)	(0.002)
agri	0.004***	-0.113***	0.002***
	(0.001)	(0.016)	(0.001)
arts	0.000	-0.021***	0.002***
	(0.000)	(0.003)	(0.000)
tourism	-0.054***	0.013	-0.002
	(0.003)	(0.030)	(0.004)
services	0.031***	-0.171***	0.022***
	(0.003)	(0.034)	(0.004)
acc	-0.002***	-0.057***	-0.003***
	(0.001)	(0.014)	(0.001)
1 commerce subject	0.007***	-0.118***	0.007***
	(0.001)	(0.012)	(0.001)
2+ commerce subjects	-0.014***	-0.172***	-0.006***
	(0.002)	(0.022)	(0.001)
acc × 1 commerce	0.003***	0.018***	0.001***
	(0.001)	(0.004)	(0.000)
enghl	-0.003***	-0.006**	-0.001**
	(0.000)	(0.003)	(0.000)

afrhl		-0.017***	0.013***	0.003***
		(0.002)	(0.003)	(0.001)
ndebhl		-0.008***	0.008***	-0.002***
		(0.001)	(0.003)	(0.001)
zuluhl		0.004***	0.161***	-0.003***
		(0.001)	(0.037)	(0.001)
sephl		-0.002**	0.059***	0.001*
		(0.001)	(0.022)	(0.000)
sothl		0.000	0.055***	-0.000
		(0.001)	(0.009)	(0.000)
sethl		-0.000	0.063***	-0.003***
		(0.000)	(0.013)	(0.001)
swathl		-0.010***	0.063***	-0.008***
		(0.001)	(0.007)	(0.001)
tshivhl		-0.000	0.080***	-0.000
		(0.001)	(0.007)	(0.001)
xitshl		-0.001**	0.037***	0.001**
		(0.000)	(0.009)	(0.000)
Constant			-0.327	
			(0.767)	
Observations	811,289	811,289	811,289	811,289

Robust standard errors in parentheses. Age, quintile and province categorical variables are normalized. Results are obtained using the -oaxaca- package in Stata 18.
*** p<0.01, ** p<0.05, * p<0.1

Table D3: Full Oaxaca-Blinder decomposition results for 2021-2023 (Quintile 1 to 3)

Outcome:		CONTRIBUTIONS:		
Average mark	Overall	Endowments	Coefficients	Interaction
2021	46.369***			
	(0.017)			
2023	49.088***			
	(0.017)			
Difference	-2.720***			
	(0.024)			
Endowments	-0.621***			
	(0.017)			
Coefficients	-1.858***			
	(0.018)			
Interaction	-0.240***			
	(0.006)			
0 years overage		-0.342***	0.462*	-0.100*
		(0.004)	(0.246)	(0.053)
1 year overage		-0.000	0.116	0.000
		(0.000)	(0.110)	(0.000)
2 years overage		-0.076***	0.004	0.001
		(0.002)	(0.064)	(0.019)
3+ years overage		-0.257***	-0.121	-0.057
		(0.004)	(0.074)	(0.035)
Missing age		0.000**	-0.000	-0.000
		(0.000)	(0.000)	(0.000)

Female	0.029***	-0.009	0.000
	(0.002)	(0.020)	(0.001)
Quintile 1	0.000	-0.096***	0.001***
	(0.000)	(0.009)	(0.000)
Quintile 2	0.001***	0.022***	0.000**
	(0.000)	(0.008)	(0.000)
Quintile 3	0.000	0.081***	-0.000
	(0.000)	(0.009)	(0.000)
Standardized LO mark	-0.000	0.000	0.000
	(0.014)	(0.001)	(0.001)
EC	-0.010***	-0.040***	0.003***
	(0.001)	(0.015)	(0.001)
FS	-0.001	0.032***	-0.000
	(0.001)	(0.005)	(0.000)
GP	0.000	0.079***	-0.001
	(0.000)	(0.006)	(0.000)
KZ	0.025***	-0.416***	-0.013***
	(0.003)	(0.018)	(0.002)
LP	0.016***	-0.398***	-0.039***
	(0.001)	(0.017)	(0.002)
MP	0.003	0.123***	-0.001
	(0.002)	(0.010)	(0.001)
NW	0.000*	0.003	-0.000
	(0.000)	(0.006)	(0.000)
NC	0.001**	0.008***	-0.000*
	(0.001)	(0.002)	(0.000)
WC	0.010***	0.060***	-0.008***
	(0.001)	(0.005)	(0.001)
Tech student	0.003***	-0.009**	0.001**
	(0.001)	(0.004)	(0.000)
math	0.020***	0.304***	-0.007***
	(0.002)	(0.027)	(0.001)
sci	0.005***	0.021	-0.001
	(0.001)	(0.028)	(0.002)
lifesci	0.003**	0.295***	-0.001**
	(0.002)	(0.036)	(0.001)
cat	0.004***	0.015***	-0.002***
	(0.001)	(0.003)	(0.000)
geog	-0.007***	-0.441***	-0.008***
	(0.001)	(0.035)	(0.001)
history	0.005***	0.324***	-0.006***
	(0.001)	(0.027)	(0.001)
geog × history	0.000	0.055***	0.001**
	(0.000)	(0.019)	(0.000)
agri	-0.008***	0.035**	0.001**
	(0.001)	(0.015)	(0.000)
arts	-0.001***	-0.009***	0.001***
	(0.000)	(0.003)	(0.000)
tourism	-0.022***	0.165***	-0.015***
	(0.002)	(0.033)	(0.003)
services	0.033***	0.192***	-0.014***
	(0.002)	(0.037)	(0.003)

acc		-0.001***	0.007	0.000
		(0.000)	(0.013)	(0.000)
1 commerce subject		-0.008***	0.078***	0.003***
		(0.001)	(0.010)	(0.001)
2+ commerce subjects		-0.038***	0.082***	0.007***
		(0.002)	(0.019)	(0.002)
acc × 1 commerce		-0.008***	-0.005	0.001
		(0.001)	(0.004)	(0.001)
enghl		0.004***	0.045***	-0.003***
		(0.001)	(0.003)	(0.001)
afrhl		0.009***	0.030***	-0.002***
		(0.002)	(0.003)	(0.000)
ndebhl		-0.000	0.019***	-0.000
		(0.000)	(0.003)	(0.000)
zuluhl		-0.002***	-0.129***	-0.003***
		(0.001)	(0.035)	(0.001)
sephl		-0.008***	0.118***	0.004***
		(0.001)	(0.020)	(0.001)
sothl		-0.000	0.028***	0.000
		(0.001)	(0.009)	(0.000)
sethl		0.002***	0.088***	-0.002***
		(0.001)	(0.013)	(0.001)
swathl		0.003***	-0.038***	-0.001**
		(0.001)	(0.006)	(0.000)
tshivhl		-0.002***	0.080***	0.012***
		(0.001)	(0.006)	(0.001)
xitshl		-0.008***	0.084***	0.007***
		(0.001)	(0.008)	(0.001)
Constant			-3.207***	
			(0.518)	
Observations	959,533	959,533	959,533	959,533

Robust standard errors in parentheses. Age, quintile and province categorical variables are normalized. Results are obtained using the -oaxaca- package in Stata 18.
*** p<0.01, ** p<0.05, * p<0.1

Table D4: Full Oaxaca-Blinder decomposition results for 2019-2023 (Quintile 1 to 3)

Outcome:		CONTRIBUTIONS:		
Average mark	Overall	Endowments	Coefficients	Interaction
2019	46.925***			
	(0.019)			
2023	49.088***			
	(0.017)			
Difference	-2.163***			
	(0.025)			
Endowments	-0.523***			
	(0.018)			
Coefficients	-1.594***			
	(0.020)			
Interaction	-0.047***			
	(0.008)			

0 years overage	-0.177***	0.589**	-0.065**
	(0.004)	(0.282)	(0.031)
1 year overage	-0.002***	0.333***	0.011**
	(0.000)	(0.126)	(0.004)
2 years overage	-0.046***	0.216***	0.038***
	(0.002)	(0.073)	(0.013)
3+ years overage	-0.093***	0.256***	0.043***
	(0.003)	(0.084)	(0.014)
Missing age	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Female	0.018***	-0.320***	0.005***
	(0.002)	(0.022)	(0.001)
Quintile 1	0.000	-0.140***	0.002***
	(0.000)	(0.009)	(0.000)
Quintile 2	0.001***	0.022**	0.001**
	(0.000)	(0.009)	(0.000)
Quintile 3	0.001***	0.130***	-0.001***
	(0.000)	(0.010)	(0.000)
Standardized LO mark	-0.000	0.000	0.000
	(0.016)	(0.002)	(0.002)
EC	-0.009***	0.027*	-0.002*
	(0.001)	(0.016)	(0.001)
FS	-0.004***	-0.011*	0.000
	(0.001)	(0.006)	(0.000)
GP	-0.004***	0.113***	0.008***
	(0.000)	(0.006)	(0.001)
KZ	0.013***	-0.493***	-0.008***
	(0.003)	(0.019)	(0.002)
LP	0.016***	-0.476***	-0.049***
	(0.001)	(0.018)	(0.003)
MP	0.023***	0.116***	-0.008***
	(0.002)	(0.011)	(0.001)
NW	0.001*	0.059***	-0.007***
	(0.001)	(0.007)	(0.001)
NC	0.002***	0.015***	-0.001***
	(0.001)	(0.002)	(0.000)
WC	-0.004***	0.041***	0.003***
	(0.001)	(0.005)	(0.001)
Tech student	0.002***	-0.038***	0.002***
	(0.001)	(0.005)	(0.001)
math	-0.170***	0.015	0.003
	(0.005)	(0.028)	(0.005)
sci	-0.006***	0.299***	0.026***
	(0.002)	(0.029)	(0.003)
lifesci	-0.032***	0.186***	0.007***
	(0.002)	(0.039)	(0.001)
cat	0.000	0.015***	-0.000
	(0.001)	(0.003)	(0.000)
geog	-0.002***	-0.107***	-0.001**
	(0.001)	(0.038)	(0.000)
history	0.032***	0.278***	-0.033***
	(0.002)	(0.030)	(0.004)

geog × history		-0.001	0.039*	-0.003*
		(0.001)	(0.021)	(0.001)
agri		-0.004**	-0.075***	-0.001**
		(0.001)	(0.016)	(0.000)
arts		-0.001***	-0.033***	0.007***
		(0.001)	(0.004)	(0.001)
tourism		-0.054***	0.180***	-0.040***
		(0.005)	(0.034)	(0.008)
services		0.087***	0.008	-0.001
		(0.005)	(0.038)	(0.007)
acc		-0.004***	-0.048***	-0.004***
		(0.001)	(0.014)	(0.001)
1 commerce subject		0.004***	-0.035***	0.001**
		(0.001)	(0.011)	(0.000)
2+ commerce subjects		-0.055***	-0.078***	-0.009***
		(0.003)	(0.021)	(0.003)
acc × 1 commerce		-0.004***	0.016***	-0.001***
		(0.001)	(0.004)	(0.000)
enghl		-0.005***	0.039***	0.003***
		(0.001)	(0.003)	(0.001)
afrhl		-0.013***	0.044***	0.005***
		(0.002)	(0.003)	(0.001)
ndebhl		-0.004***	0.027***	-0.005***
		(0.001)	(0.003)	(0.001)
zuluhl		-0.000	0.029	0.000
		(0.000)	(0.037)	(0.000)
sephl		-0.012***	0.175***	0.009***
		(0.002)	(0.021)	(0.001)
sothl		0.000	0.083***	-0.000
		(0.001)	(0.009)	(0.001)
sethl		0.006***	0.153***	-0.011***
		(0.001)	(0.014)	(0.001)
swathl		-0.012***	0.023***	-0.002***
		(0.001)	(0.007)	(0.001)
tshivhl		-0.002***	0.149***	0.022***
		(0.001)	(0.006)	(0.002)
xitshl		-0.011***	0.118***	0.013***
		(0.001)	(0.009)	(0.001)
Constant			-3.533***	
			(0.589)	
Observations	789,976	789,976	789,976	789,976

Robust standard errors in parentheses. Age, quintile and province categorical variables are normalized. Results are obtained using the -oaxaca- package in Stata 18.

*** p<0.01, ** p<0.05, * p<0.1

Table D5: Full Oaxaca-Blinder decomposition results for 2011-2023 (Quintile 1 to 3)

Outcome:		CONTRIBUTIONS:		
Average mark	Overall	Endowments	Coefficients	Interaction
2011	42.742***			
	(0.018)			
2023	49.088***			
	(0.017)			
Difference	-6.346***			
	(0.024)			
Endowments	-0.593***			
	(0.023)			
Coefficients	-5.024***			
	(0.023)			
Interaction	-0.730***			
	(0.020)			
0 years overage		-0.597***	0.286***	-0.108***
		(0.006)	(0.018)	(0.007)
1 year overage		0.003***	0.190***	-0.010***
		(0.000)	(0.008)	(0.001)
2 years overage		-0.042***	0.131***	0.021***
		(0.002)	(0.006)	(0.001)
3+ years overage		-0.203***	0.106***	0.039***
		(0.004)	(0.006)	(0.002)
Missing age		0.341***	-0.000	-0.388***
		(0.007)	(0.000)	(0.009)
Female		0.070***	-0.085***	0.005***
		(0.003)	(0.022)	(0.001)
Quintile 1		0.000	-0.170***	0.010***
		(0.000)	(0.009)	(0.001)
Quintile 2		0.002***	0.018**	0.001**
		(0.000)	(0.009)	(0.000)
Quintile 3		-0.001***	0.167***	0.003***
		(0.000)	(0.010)	(0.001)
Standardized LO mark		0.002	0.001	-0.001
		(0.016)	(0.003)	(0.004)
EC		-0.006***	-0.418***	0.020***
		(0.001)	(0.016)	(0.002)
FS		0.003**	-0.084***	-0.002*
		(0.001)	(0.006)	(0.001)
GP		0.003***	0.156***	-0.009***
		(0.000)	(0.006)	(0.001)
KZ		0.050***	-0.501***	-0.031***
		(0.003)	(0.020)	(0.002)
LP		0.024***	-0.070***	-0.010***
		(0.002)	(0.018)	(0.003)
MP		-0.001	0.079***	0.000
		(0.002)	(0.011)	(0.000)
NW		0.003*	0.170***	-0.060***
		(0.002)	(0.007)	(0.003)
NC		-0.003***	0.002	0.000
		(0.001)	(0.002)	(0.000)

WC	0.010***	0.075***	-0.010***
	(0.001)	(0.005)	(0.001)
Tech student	0.015***	0.025***	-0.008***
	(0.001)	(0.005)	(0.002)
math	-0.197***	0.239***	0.051***
	(0.005)	(0.025)	(0.006)
sci	-0.016***	-0.249***	-0.054***
	(0.004)	(0.028)	(0.006)
lifesci	0.028***	0.031	-0.001
	(0.002)	(0.040)	(0.001)
cat	-0.024***	0.024***	0.015***
	(0.001)	(0.003)	(0.002)
geog	0.066***	-0.147***	0.028***
	(0.005)	(0.038)	(0.007)
history	0.120***	0.068**	-0.031**
	(0.009)	(0.034)	(0.015)
geog × history	-0.005	-0.105***	0.041***
	(0.005)	(0.024)	(0.009)
agri	0.019***	0.024	-0.001
	(0.001)	(0.016)	(0.001)
arts	-0.005***	0.029***	-0.021***
	(0.002)	(0.005)	(0.003)
tourism	-0.119***	-0.026	0.013
	(0.012)	(0.035)	(0.017)
services	0.201***	0.459***	-0.203***
	(0.012)	(0.039)	(0.017)
acc	-0.045***	-0.057***	-0.060***
	(0.010)	(0.015)	(0.016)
1 commerce subject	0.067***	0.038***	-0.013***
	(0.003)	(0.012)	(0.004)
2+ commerce subjects	-0.319***	0.048**	0.033**
	(0.010)	(0.024)	(0.016)
acc × 1 commerce	-0.017***	-0.020***	0.006***
	(0.001)	(0.004)	(0.001)
enghl	0.010***	0.079***	-0.012***
	(0.001)	(0.003)	(0.001)
afrhl	-0.007***	0.104***	0.006***
	(0.002)	(0.003)	(0.002)
ndebhl	-0.002***	0.012***	-0.001***
	(0.000)	(0.003)	(0.000)
zuluhl	-0.002***	-0.055	-0.001
	(0.001)	(0.038)	(0.001)
sephl	-0.035***	0.097***	0.014***
	(0.003)	(0.022)	(0.003)
sothl	0.000	0.075***	-0.000
	(0.001)	(0.010)	(0.001)
sethl	0.017***	0.070***	-0.015***
	(0.002)	(0.014)	(0.003)
swathl	0.005***	0.033***	0.001***
	(0.001)	(0.007)	(0.000)
tshivhl	-0.000*	0.061***	0.001*
	(0.000)	(0.006)	(0.001)

xitshl		-0.008***	0.105***	0.008***
		(0.001)	(0.009)	(0.001)
Constant			-6.041***	
			(0.178)	
Observations	792,425	792,425	792,425	792,425

Robust standard errors in parentheses. Age, quintile and province categorical variables are normalized. Results are obtained using the -oaxaca- package in Stata 18.
*** p<0.01, ** p<0.05, * p<0.1

Table D6: Full Oaxaca-Blinder decomposition results for 2011-2019 (Quintile 5)

Outcome:		CONTRIBUTIONS:		
Average mark	Overall	Endowments	Coefficients	Interaction
2011	56.975***			
	(0.045)			
2019	54.859***			
	(0.041)			
Difference	2.116***			
	(0.061)			
Endowments	0.254***			
	(0.044)			
Coefficients	2.272***			
	(0.051)			
Interaction	-0.410***			
	(0.028)			
0 years overage		-0.203***	1.096***	-0.063***
		(0.010)	(0.076)	(0.005)
1 year overage		0.001	0.222***	0.003
		(0.001)	(0.021)	(0.002)
2 years overage		0.019***	0.038***	-0.005***
		(0.003)	(0.008)	(0.001)
3+ years overage		-0.009**	0.002	0.000
		(0.003)	(0.004)	(0.000)
Missing age		0.211***	0.000	-0.172***
		(0.004)	(0.000)	(0.008)
Female		0.007***	0.083	-0.002
		(0.002)	(0.057)	(0.002)
Standardized LO mark		0.007	0.000	-0.000
		(0.029)	(0.001)	(0.002)
EC		0.011***	-0.028***	-0.007***
		(0.002)	(0.010)	(0.003)
FS		-0.007***	0.060***	0.009***
		(0.001)	(0.010)	(0.002)
GP		0.070***	0.311***	-0.058***
		(0.005)	(0.036)	(0.007)
KZ		-0.042***	-0.255***	-0.037***
		(0.004)	(0.028)	(0.005)
LP		0.000	0.005	0.001
		(0.001)	(0.006)	(0.001)

MP	0.001	-0.000	-0.000
	(0.002)	(0.006)	(0.003)
NW	0.013***	0.014***	0.010***
	(0.002)	(0.003)	(0.002)
NC	-0.001**	-0.006	-0.001
	(0.001)	(0.006)	(0.001)
WC	-0.016***	-0.367***	0.021***
	(0.003)	(0.029)	(0.004)
Tech student	-0.377***	0.205***	0.234***
	(0.014)	(0.012)	(0.014)
egd	0.009***	0.282***	0.018***
	(0.002)	(0.029)	(0.004)
math	0.020***	0.185*	0.015*
	(0.006)	(0.105)	(0.009)
1 non-math stem	0.005***	0.886***	-0.018***
	(0.002)	(0.082)	(0.005)
2+ non-math stem	-0.096***	1.028***	0.173***
	(0.012)	(0.094)	(0.018)
math × 1 stem	0.025***	-0.216***	-0.019***
	(0.004)	(0.040)	(0.004)
math × 2+ stem	0.061***	-0.152**	-0.016*
	(0.008)	(0.077)	(0.008)
cat	0.071***	-0.110***	-0.048***
	(0.008)	(0.024)	(0.011)
geog	0.112***	0.473***	-0.109***
	(0.010)	(0.059)	(0.014)
history	-0.190***	0.291***	-0.124***
	(0.014)	(0.049)	(0.021)
geog × history	0.053***	0.029	-0.015
	(0.007)	(0.024)	(0.012)
it	0.028***	-0.042***	-0.009***
	(0.004)	(0.009)	(0.002)
consumers	-0.001	0.325***	-0.011***
	(0.001)	(0.024)	(0.004)
tourism	-0.008***	0.260***	-0.011***
	(0.002)	(0.032)	(0.003)
agri	0.013***	0.018**	-0.004**
	(0.002)	(0.007)	(0.002)
arts	-0.005	0.236***	-0.002
	(0.008)	(0.022)	(0.003)
acc	0.199***	-0.064	-0.032
	(0.015)	(0.043)	(0.022)
1 commerce subject	0.061***	1.258***	-0.076***
	(0.007)	(0.069)	(0.008)
2+ commerce subjects	-0.142***	0.573***	0.119***
	(0.011)	(0.049)	(0.012)
acc × 1 commerce	0.111***	-0.197***	-0.071***
	(0.008)	(0.026)	(0.010)
enghl	0.255***	0.889***	-0.108***
	(0.009)	(0.078)	(0.010)
zulufal	-0.012***	-0.029*	0.003*
	(0.002)	(0.017)	(0.002)

Constant			-5.032***	
			(0.416)	
Observations	173,627	173,627	173,627	173,627

Robust standard errors in parentheses. Age and province categorical variables are normalized. Results are obtained using the -oaxaca- package in Stata 18 and zero covariances (resulting from missing ages) are ignored using the -, relax- option.
*** p<0.01, ** p<0.05, * p<0.1

Table D7: Full Oaxaca-Blinder decomposition results for 2019-2021 (Quintile 5)

Outcome:		CONTRIBUTIONS:		
Average mark	Overall	Endowments	Coefficients	Interaction
2019	54.859***			
	(0.041)			
2021	55.314***			
	(0.041)			
Difference	-0.455***			
	(0.058)			
Endowments	0.356***			
	(0.041)			
Coefficients	-0.736***			
	(0.043)			
Interaction	-0.075***			
	(0.012)			
0 years overage		0.152***	-0.515***	-0.020***
		(0.010)	(0.066)	(0.003)
1 year overage		-0.001*	0.028	-0.001
		(0.001)	(0.019)	(0.001)
2 years overage		0.045***	0.020**	-0.004**
		(0.004)	(0.008)	(0.002)
3+ years overage		0.062***	0.012**	-0.005**
		(0.004)	(0.005)	(0.002)
Missing age		-0.000	-0.000	0.000
		(0.000)	(0.000)	(0.000)
Female		-0.000	-0.220***	-0.001
		(0.000)	(0.051)	(0.001)
Standardized LO mark		-0.006	0.000	0.000
		(0.028)	(0.001)	(0.002)
EC		0.004***	-0.031***	-0.002**
		(0.001)	(0.009)	(0.001)
FS		-0.001	-0.034***	-0.006***
		(0.001)	(0.008)	(0.002)
GP		0.031***	0.135***	-0.008***
		(0.003)	(0.036)	(0.002)
KZ		0.005	0.078***	-0.001
		(0.003)	(0.026)	(0.001)

LP	0.000	-0.013**	-0.000
	(0.000)	(0.006)	(0.000)
MP	0.001	-0.003	-0.000
	(0.001)	(0.005)	(0.001)
NW	0.000	0.010***	0.001
	(0.000)	(0.003)	(0.001)
NC	0.001	0.002	-0.000
	(0.000)	(0.005)	(0.000)
WC	0.012***	-0.007	-0.000
	(0.002)	(0.026)	(0.001)
Tech student	-0.036***	-0.008	-0.001
	(0.007)	(0.011)	(0.001)
egd	0.014***	-0.111***	-0.006***
	(0.003)	(0.027)	(0.002)
math	0.074***	-0.428***	-0.048***
	(0.008)	(0.091)	(0.011)
1 non-math stem	0.010***	-0.481***	-0.022***
	(0.003)	(0.074)	(0.004)
2+ non-math stem	0.001	-0.537***	-0.042***
	(0.005)	(0.088)	(0.008)
math × 1 stem	0.021***	0.109***	0.017***
	(0.004)	(0.033)	(0.005)
math × 2+ stem	0.004	0.470***	0.033***
	(0.004)	(0.073)	(0.007)
cat	-0.011***	0.017	-0.001
	(0.002)	(0.026)	(0.002)
geog	-0.033***	0.207***	0.010***
	(0.005)	(0.054)	(0.003)
history	-0.028***	0.118**	-0.009**
	(0.004)	(0.048)	(0.004)
geog × history	0.003***	-0.052***	0.003**
	(0.001)	(0.020)	(0.001)
it	0.014***	-0.027***	-0.003**
	(0.004)	(0.008)	(0.001)
consumers	0.004***	-0.053**	-0.003**
	(0.001)	(0.021)	(0.001)
tourism	-0.067***	-0.071*	0.015*
	(0.006)	(0.038)	(0.008)
agri	0.003***	-0.054***	0.011***
	(0.001)	(0.008)	(0.002)
arts	0.051***	-0.039**	-0.004*
	(0.008)	(0.019)	(0.002)
acc	-0.042***	-0.000	0.000
	(0.005)	(0.043)	(0.004)
1 commerce subject	-0.002*	-0.899***	-0.023***
	(0.001)	(0.065)	(0.005)
2+ commerce subjects	0.036***	-0.405***	0.041***
	(0.005)	(0.050)	(0.006)
acc × 1 commerce	0.006**	0.136***	0.005**
	(0.003)	(0.024)	(0.002)
enghl	0.039***	-0.120	0.002
	(0.006)	(0.074)	(0.001)

zulufal		-0.010***	0.043***	-0.004**
		(0.002)	(0.016)	(0.002)
Constant			1.990***	
			(0.411)	
Observations	201,922	201,922	201,922	201,922

Robust standard errors in parentheses. Age and province categorical variables are normalized. Results are obtained using the -oaxaca- package in Stata 18 and zero covariances (resulting from missing ages) are ignored using the -, relax- option.
*** p<0.01, ** p<0.05, * p<0.1

Table D8: Full Oaxaca-Blinder decomposition results for 2021-2023 (Quintile 5)

Outcome:		CONTRIBUTIONS:		
Average mark	Overall	Endowments	Coefficients	Interaction
2021	55.314***			
	(0.041)			
2023	54.292***			
	(0.040)			
Difference	1.022***			
	(0.057)			
Endowments	-0.369***			
	(0.038)			
Coefficients	1.439***			
	(0.043)			
Interaction	-0.047***			
	(0.008)			
0 years overage		-0.181***	0.530***	-0.027***
		(0.009)	(0.069)	(0.004)
1 year overage		-0.001	0.034*	0.004*
		(0.001)	(0.017)	(0.002)
2 years overage		-0.049***	-0.014**	-0.005**
		(0.004)	(0.006)	(0.002)
3+ years overage		-0.049***	-0.013***	-0.007***
		(0.004)	(0.003)	(0.002)
Missing age		0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)
Female		0.000	0.066	-0.000
		(0.000)	(0.051)	(0.000)
Standardized LO mark		-0.021	-0.001	0.001
		(0.028)	(0.001)	(0.001)
EC		-0.003***	0.030***	-0.002**
		(0.001)	(0.010)	(0.001)
FS		0.005***	-0.054***	-0.006***
		(0.001)	(0.008)	(0.001)
GP		-0.006**	-0.052	-0.001
		(0.003)	(0.035)	(0.001)
KZ		-0.007**	-0.050**	-0.001
		(0.003)	(0.025)	(0.001)

LP	-0.001*	0.002	-0.000
	(0.000)	(0.006)	(0.000)
MP	-0.000	-0.007	0.000
	(0.000)	(0.006)	(0.000)
NW	0.000	0.002	0.000
	(0.000)	(0.003)	(0.000)
NC	0.001	0.021***	-0.001
	(0.001)	(0.005)	(0.001)
WC	-0.006***	0.069**	-0.002**
	(0.002)	(0.027)	(0.001)
Tech student	0.026***	-0.052***	0.005***
	(0.005)	(0.012)	(0.002)
egd	-0.004	-0.001	0.000
	(0.003)	(0.026)	(0.000)
math	-0.026***	0.165*	-0.008*
	(0.004)	(0.098)	(0.005)
1 non-math stem	0.003**	0.091	0.002
	(0.001)	(0.069)	(0.001)
2+ non-math stem	0.010*	0.121	-0.011
	(0.006)	(0.094)	(0.008)
math × 1 stem	-0.000	0.051	-0.000
	(0.001)	(0.035)	(0.001)
math × 2+ stem	-0.006	0.003	-0.000
	(0.006)	(0.082)	(0.008)
cat	-0.020***	-0.025	0.002
	(0.002)	(0.028)	(0.003)
geog	-0.013***	-0.226***	-0.007***
	(0.003)	(0.050)	(0.002)
history	-0.001	0.403***	0.007**
	(0.001)	(0.045)	(0.003)
geog × history	-0.001	-0.032*	-0.001
	(0.000)	(0.019)	(0.001)
it	-0.033***	-0.024**	0.004**
	(0.005)	(0.009)	(0.002)
consumers	-0.000	-0.056***	0.000
	(0.002)	(0.021)	(0.001)
tourism	-0.008***	0.077**	-0.002*
	(0.002)	(0.037)	(0.001)
agri	0.003***	-0.003	0.001
	(0.001)	(0.008)	(0.002)
arts	0.024***	0.015	0.001
	(0.007)	(0.018)	(0.001)
acc	0.021***	0.004	0.000
	(0.004)	(0.040)	(0.002)
1 commerce subject	-0.008***	0.129**	0.004**
	(0.002)	(0.060)	(0.002)
2+ commerce subjects	-0.035***	0.033	0.003
	(0.005)	(0.044)	(0.004)
acc × 1 commerce	0.007***	-0.002	-0.000
	(0.003)	(0.022)	(0.001)
enghl	0.009	0.591***	-0.002
	(0.007)	(0.073)	(0.002)

zulufal		-0.003	-0.168***	0.002
		(0.004)	(0.016)	(0.002)
Constant			-0.219	
			(0.385)	
Observations	213,310	213,310	213,310	213,310

Robust standard errors in parentheses. Age and province categorical variables are normalized. Results are obtained using the -oaxaca- package in Stata 18 and zero covariances (resulting from missing ages) are ignored using the -, relax- option.
*** p<0.01, ** p<0.05, * p<0.1

Table D9: Full Oaxaca-Blinder decomposition results for 2019-2023 (Quintile 5)

Outcome:		CONTRIBUTIONS:		
Average mark	Overall	Endowments	Coefficients	Interaction
2019	54.859***			
	(0.041)			
2023	54.292***			
	(0.040)			
Difference	0.568***			
	(0.057)			
Endowments	-0.018			
	(0.040)			
Coefficients	0.678***			
	(0.044)			
Interaction	-0.092***			
	(0.014)			
0 years overage		-0.048***	-0.013	0.000
		(0.009)	(0.064)	(0.001)
1 year overage		-0.000	0.060***	0.003***
		(0.001)	(0.017)	(0.001)
2 years overage		-0.008**	0.001	0.000
		(0.003)	(0.007)	(0.000)
3+ years overage		0.005*	-0.005	0.000
		(0.003)	(0.004)	(0.000)
Missing age		0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)
Female		-0.000	-0.155***	-0.000
		(0.000)	(0.051)	(0.001)
Standardized LO mark		-0.027	-0.002	0.002
		(0.029)	(0.002)	(0.003)
EC		-0.000	-0.002	0.000
		(0.001)	(0.010)	(0.000)
FS		0.015***	-0.085***	-0.026***
		(0.002)	(0.007)	(0.003)
GP		0.022***	0.081**	-0.004**
		(0.003)	(0.035)	(0.002)
KZ		-0.002	0.026	0.000
		(0.003)	(0.025)	(0.000)

LP	-0.001	-0.011*	0.000
	(0.000)	(0.006)	(0.000)
MP	0.001**	-0.010*	-0.001
	(0.001)	(0.006)	(0.001)
NW	0.000	0.012***	0.001*
	(0.000)	(0.003)	(0.001)
NC	0.003***	0.023***	-0.002**
	(0.001)	(0.006)	(0.001)
WC	0.003*	0.061**	0.001
	(0.002)	(0.027)	(0.001)
Tech student	-0.004	-0.061***	-0.001
	(0.005)	(0.012)	(0.001)
egd	0.010***	-0.114***	-0.005***
	(0.003)	(0.027)	(0.002)
math	0.030***	-0.286***	-0.016***
	(0.005)	(0.097)	(0.006)
1 non-math stem	0.009***	-0.381***	-0.025***
	(0.003)	(0.071)	(0.005)
2+ non-math stem	0.002	-0.470***	0.009**
	(0.001)	(0.095)	(0.004)
math × 1 stem	0.013***	0.160***	0.024***
	(0.004)	(0.034)	(0.005)
math × 2+ stem	-0.002	0.524***	-0.018***
	(0.002)	(0.080)	(0.005)
cat	-0.032***	-0.005	0.001
	(0.003)	(0.028)	(0.004)
geog	-0.034***	-0.025	-0.002
	(0.004)	(0.051)	(0.004)
history	0.002	0.519***	-0.031***
	(0.002)	(0.046)	(0.005)
geog × history	0.001	-0.083***	0.003**
	(0.001)	(0.019)	(0.001)
it	-0.017***	-0.056***	0.005***
	(0.005)	(0.009)	(0.002)
consumers	0.007***	-0.110***	-0.006***
	(0.002)	(0.021)	(0.002)
tourism	-0.060***	0.004	-0.001
	(0.006)	(0.039)	(0.009)
agri	0.006***	-0.071***	0.026***
	(0.002)	(0.009)	(0.004)
arts	0.073***	-0.022	-0.003
	(0.008)	(0.018)	(0.003)
acc	-0.021***	0.004	-0.000
	(0.004)	(0.041)	(0.002)
1 commerce subject	-0.013***	-0.740***	-0.045***
	(0.003)	(0.062)	(0.006)
2+ commerce subjects	0.004	-0.335***	0.004
	(0.004)	(0.045)	(0.004)
acc × 1 commerce	0.013***	0.129***	0.011***
	(0.003)	(0.023)	(0.003)
enghl	0.060***	0.471***	-0.011***
	(0.008)	(0.074)	(0.002)

zulufal		-0.028***	-0.125***	0.013***
		(0.004)	(0.016)	(0.002)
Constant			1.771***	
			(0.403)	
Observations	202,852	202,852	202,852	202,852

Robust standard errors in parentheses. Age and province categorical variables are normalized. Results are obtained using the -oaxaca- package in Stata 18 and zero covariances (resulting from missing ages) are ignored using the -, relax- option.
*** p<0.01, ** p<0.05, * p<0.1

Table D10: Full Oaxaca-Blinder decomposition results for 2011-2023 (Quintile 5)

Outcome:		CONTRIBUTIONS:		
Average mark	Overall	Endowments	Coefficients	Interaction
2011	56.975***			
	(0.045)			
2023	54.292***			
	(0.040)			
Difference	2.683***			
	(0.060)			
Endowments	0.535***			
	(0.045)			
Coefficients	2.888***			
	(0.051)			
Interaction	-0.739***			
	(0.030)			
0 years overage		-0.252***	1.098***	-0.077***
		(0.010)	(0.077)	(0.006)
1 year overage		-0.001	0.270***	0.019***
		(0.001)	(0.020)	(0.003)
2 years overage		0.012***	0.037***	-0.003***
		(0.003)	(0.008)	(0.001)
3+ years overage		-0.003	-0.003	-0.000
		(0.003)	(0.004)	(0.000)
Missing age		0.212***	0.000	-0.172***
		(0.004)	(0.000)	(0.008)
Female		0.003**	-0.072	0.002
		(0.001)	(0.056)	(0.001)
Standardized LO mark		-0.020	-0.003	0.003
		(0.031)	(0.003)	(0.005)
EC		0.012***	-0.030***	-0.008***
		(0.002)	(0.010)	(0.003)
FS		0.024***	-0.039***	-0.019***
		(0.003)	(0.008)	(0.004)
GP		0.107***	0.407***	-0.091***
		(0.006)	(0.038)	(0.009)
KZ		-0.048***	-0.227***	-0.035***
		(0.004)	(0.027)	(0.005)

LP	0.002***	-0.006	-0.001
	(0.001)	(0.006)	(0.001)
MP	0.008***	-0.010*	-0.007*
	(0.003)	(0.006)	(0.004)
NW	0.005**	0.025***	0.021***
	(0.002)	(0.003)	(0.003)
NC	-0.001	0.017***	0.000
	(0.001)	(0.006)	(0.001)
WC	-0.009***	-0.301***	0.013***
	(0.002)	(0.028)	(0.003)
Tech student	-0.311***	0.141***	0.165***
	(0.012)	(0.011)	(0.013)
egd	0.027***	0.157***	0.017***
	(0.004)	(0.027)	(0.003)
math	0.074***	-0.110	-0.016
	(0.010)	(0.101)	(0.014)
1 non-math stem	0.006***	0.452***	0.020***
	(0.002)	(0.074)	(0.004)
2+ non-math stem	-0.016*	0.578***	0.084***
	(0.009)	(0.092)	(0.014)
math × 1 stem	0.022***	-0.027	-0.007
	(0.006)	(0.036)	(0.009)
math × 2+ stem	0.004	0.366***	0.025***
	(0.004)	(0.081)	(0.006)
cat	0.041***	-0.137***	-0.028***
	(0.004)	(0.028)	(0.006)
geog	0.071***	0.413***	-0.069***
	(0.007)	(0.053)	(0.009)
history	0.019	0.829***	-0.380***
	(0.014)	(0.051)	(0.024)
geog × history	0.014*	-0.053**	0.028**
	(0.007)	(0.025)	(0.013)
it	0.022***	-0.103***	-0.011***
	(0.006)	(0.010)	(0.003)
consumers	0.002	0.199***	0.003
	(0.002)	(0.022)	(0.003)
tourism	-0.068***	0.343***	-0.091***
	(0.007)	(0.039)	(0.011)
agri	0.008***	-0.043***	0.022***
	(0.003)	(0.011)	(0.006)
arts	0.069***	0.184***	0.024***
	(0.008)	(0.019)	(0.004)
acc	0.176***	-0.064	-0.027
	(0.013)	(0.044)	(0.019)
1 commerce subject	0.001	0.446***	-0.001
	(0.001)	(0.062)	(0.003)
2+ commerce subjects	-0.069***	0.245***	0.047***
	(0.007)	(0.048)	(0.010)
acc × 1 commerce	0.074***	-0.053**	-0.025**
	(0.008)	(0.024)	(0.011)
enghl	0.371***	1.381***	-0.194***
	(0.011)	(0.078)	(0.012)

zulufal		-0.051***	-0.158***	0.029***
		(0.004)	(0.018)	(0.004)
Constant			-3.261***	
			(0.391)	
Observations	185,015	185,015	185,015	185,015

Robust standard errors in parentheses. Age and province categorical variables are normalized. Results are obtained using the -oaxaca- package in Stata 18 and zero covariances (resulting from missing ages) are ignored using the -, relax- option.

*** p<0.01, ** p<0.05, * p<0.1