

Supplementary Appendix: The Leaky College Pipeline: Evidence from Administrative Data in Uganda

Isaac Ahimbisibwe, Adrien Dautheville, Lenka Fiala,
Saint Kizito Omala, and Wayne Aaron Sandholtz*

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A1 Additional institutional details

This appendix section provides additional institutional detail underlying the centralized, exam-based progression system described in the main text. Advancement between education levels is governed by national exit examinations administered by the Uganda National Examinations Board (UNEB). School- or program-by year (for university) test score cutoffs for progression are set annually based on national score distributions and apply uniformly across students regardless of school type. These cutoffs fluctuate from year to year with aggregate performance, rather than being fixed thresholds, although fail/pass thresholds do not change by year.

Attrition observed at key transition points reflects heterogeneous constraints across schooling tracks. Students enrolled in fee-paying private or semi-private schools may exit schooling when tuition and related costs become binding. While such students could transfer into publicly funded schools, these transitions often involve a decline in instructional quality. Meanwhile, students enrolled in tuition-free public schools face limited direct costs but are more exposed to academic attrition driven

*Ahimbisibwe: Baylor University, Waco Texas (Isaac_Ahimbisibwe@baylor.edu); Dautheville: Norwegian School of Economics (adrien.dautheville@nhh.no); Fiala: University of Ottawa, Institute for Replication, and Tilburg University (lfiala@uottawa.ca); Omala: Department of Statistical Methods & Actuarial Science, School of Statistics and Planning, College of Business and Management Sciences, Makerere University (kizyomala@gmail.com); Sandholtz: Nova School of Business and Economics (wayne.sandholtz@novasbe.pt). We thank João Dourado, Chhavi Kankaria, and Tracy Nalumansi for excellent research assistance. Funding for this project came from Fundação para a Ciência e a Tecnologia and Policy Impacts. This work was also funded by Fundação para a Ciência e a Tecnologia (UIDB/00124/2020, UIDP/00124/2020, UID/00124, Nova School of Business and Economics and Social Sciences DataLab - PINFRA/22209/2016), POR Lisboa and POR Norte (Social Sciences DataLab, PINFRA/22209/2016).

by limited instructional inputs and weaker science infrastructure, among other factors. These mechanisms operate within a system where exam performance alone determines eligibility for progression.

Lower secondary education offers students a broad curriculum, but subject availability varies across schools due to resource constraints. In the final two years of lower secondary school, students select a subset of subjects to sit for national examinations. Performance on these examinations determines both eligibility for upper secondary schooling and the subject combinations available at A-level. At the upper secondary level, students are assigned three principal subjects based on exam performance and school capacity. These subject combinations, in turn, constrain the set of university majors for which students are academically eligible. The number of subjects offered beyond the required minimum varies by school type. Schools with more resources are able to offer more choices. As a result, early academic tracking implies that students attending schools with fewer resources, particularly tuition-free schools, enter the tertiary pipeline with considerably more constrained choice sets than their peers in better-resourced schools.

Applications to public universities require students to rank intended majors prior to receiving their national exam scores or contemporaneous admission cutoffs. Exam results and admission decisions are released several months later. Students not admitted under the government-sponsored scheme may subsequently apply under self-financing schemes with full information about their exam performance and recent cutoffs. This staggered information structure shapes application behavior and sorting around admission thresholds.

We compute weighted admission scores for each applicant–major pair, following the official weighting formulas used by public universities. These weights vary by major to reflect differences in subject requirements, implying that the same student may face different effective scores across programs. We combine these weighted scores with publicly available program-year admission cutoffs released after each admissions cycle to construct major-specific running variables governing admission decisions.

A2 Plotting attrition at various stages

Figure A1 is built on the same data as Figure 1, but shows shares of the full cohort in each category rather than absolute number of students. The data for both figures comes from the UNEB data and contains all students who sat the PLE in 2011; their linked O-level scores (regardless of the year in which the exam was taken); and their linked A-level scores (regardless of year). The data on the “Merit Scholarship” stage comes from the PUJAB data and consists of all merit scholarship applicants for the university academic year 2018/2019, which corresponds to on-time grade progression for the 2011 PLE cohort.

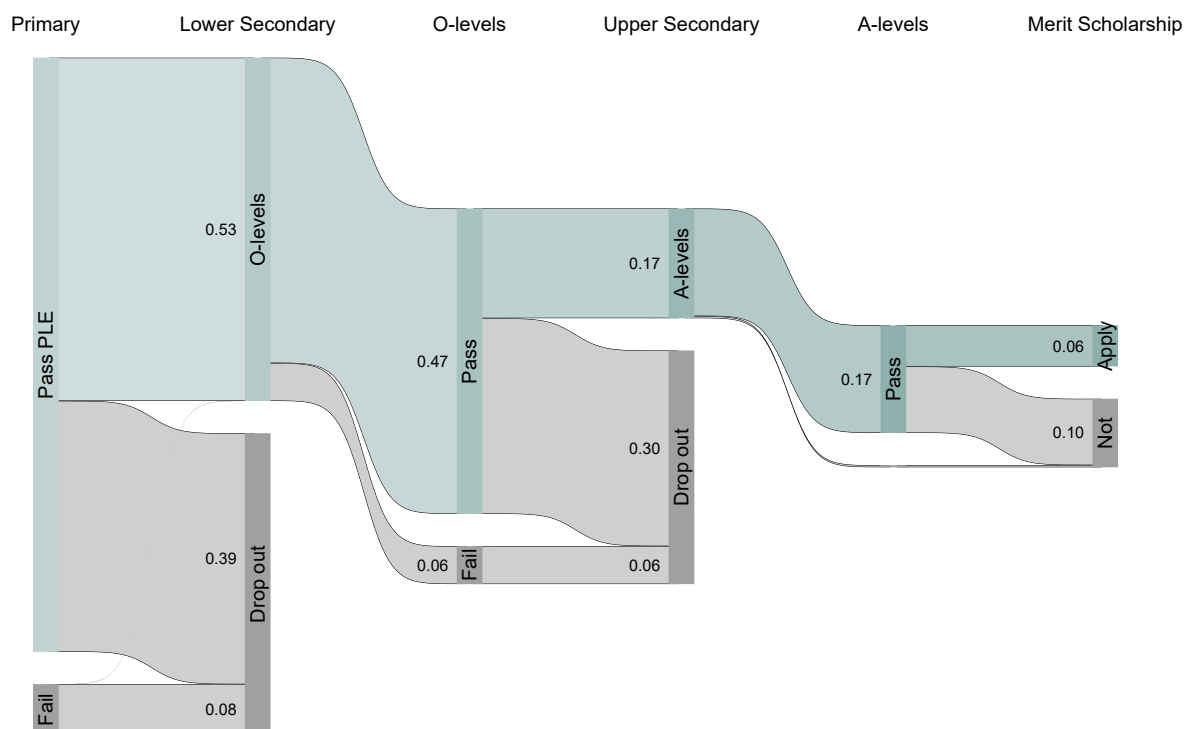


Figure A1: The Leaky Pipeline Expressed in Percentages

Progression of the 2011 PLE cohort through Uganda’s education system, from primary examinations (PLE) to O-levels, A-levels, and merit scholarship applications. Shares of students at each stage are expressed as percentages of the original PLE cohort (570,768 students).

A3 Post-Primary Transition Rates

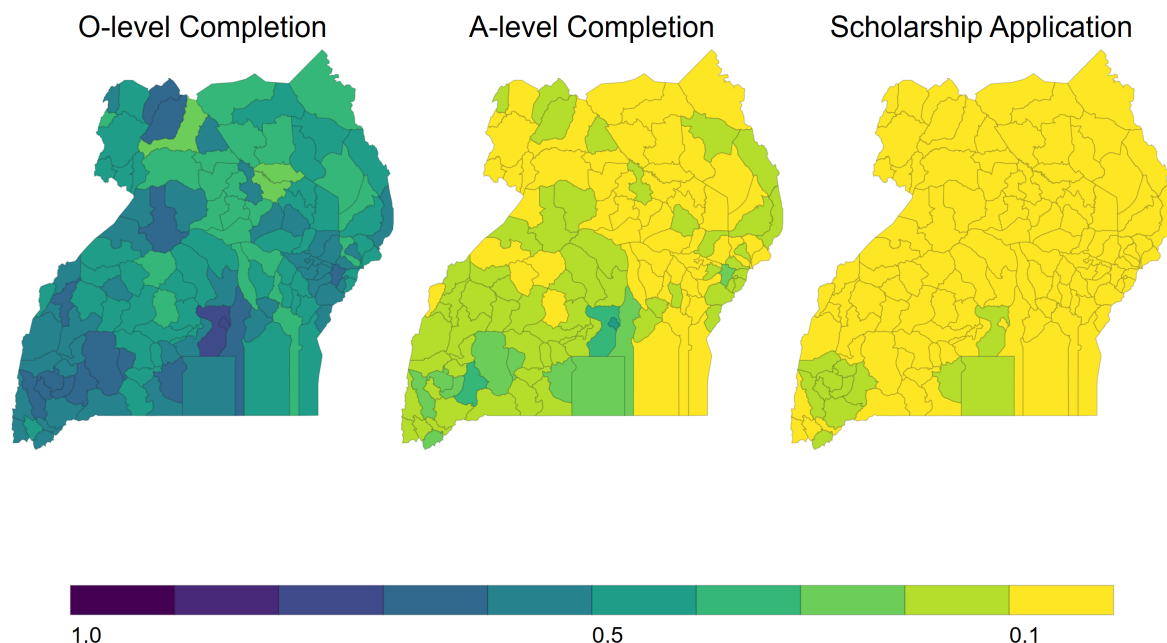


Figure A2: The Leaky Pipeline, by District

Note: We plot the share of PLE test takers who complete O-level, A-level, and who apply for the national merit scholarship, by district of PLE completion.

Figure A2 plots district-level variation in post-primary educational progression. The left panel shows the share of Primary Leaving Examination (PLE) candidates who complete O-level; the middle panel shows the share who complete A-level; and the right panel shows the share who apply for the national merit scholarship. The figure reveals a strong geographic concentration in post-primary progression, with substantial attrition at each successive stage.

First, while a non-trivial share of PLE candidates complete O-level in many districts, continuation to A-level drops sharply and unevenly across units and is concentrated in GMKA and selected districts in the South West. This pattern reveals a big bottleneck at the transition to upper secondary driven by uneven spatial access to A-level, which in the end will affect who access to scholarship applications. Indeed, scholarship application rates are uniformly low and geographically compressed relative to earlier stages of the pipeline. Interestingly, even in districts with relatively high A-level completion, only a small fraction of PLE candidates apply for the merit scholarship. This pattern suggests that eligibility alone does not translate into take-up in scholarship application and underscores that barriers

arise before the top of college pipeline

Taken together, the three panels illustrate a “leaky pipeline:” geographic disparities widen as students progress through the education system, and many students who successfully complete secondary education never reach the scholarship margin. Importantly, some districts with high early retention are not necessarily those with high scholarship application rates, implying that scholarship programs may primarily benefit a selective subset of students rather than broadly expanding access.

A4 Overlapping exam performance distributions

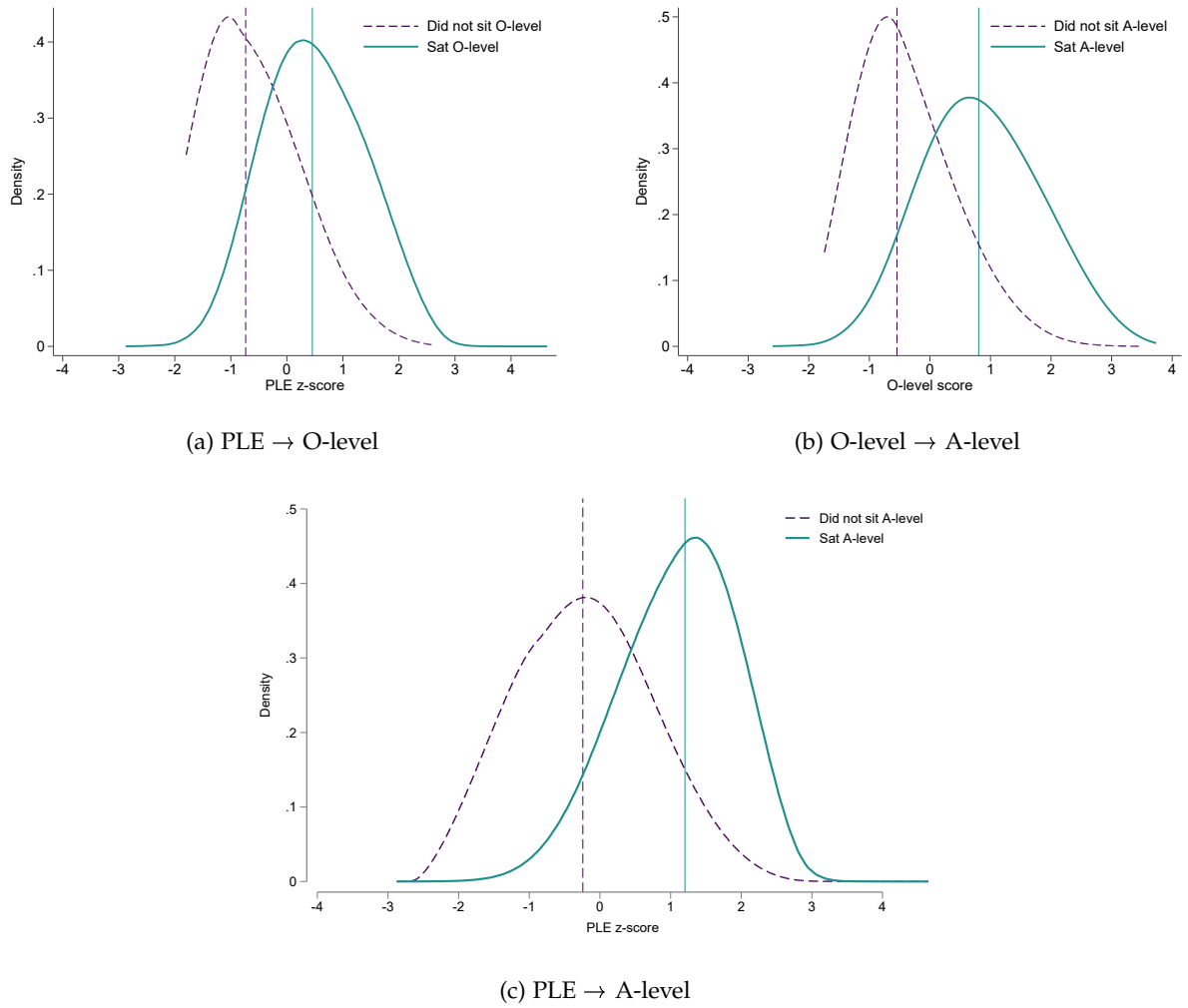


Figure A3: Overlap in performance distributions across schooling transitions

This figure shows kernel density plots to demonstrate the overlapping distributions of lower-level exam scores by whether the students went on to take higher-level exams. Panel (a) plots the distribution of PLE scores for students who did and did not go on to sit O-levels. Panel (b) plots the distribution of O-level scores for students who did and did not go on to sit A-levels. Panel (c) plots the distribution of PLE scores for students who did and did not go on to sit A levels. PLE and O-level z-scores are defined as aggregate points, standardized within cohort and inverted so that higher values indicate better performance. Vertical lines denote distribution medians.

A5 Geographic Concentration

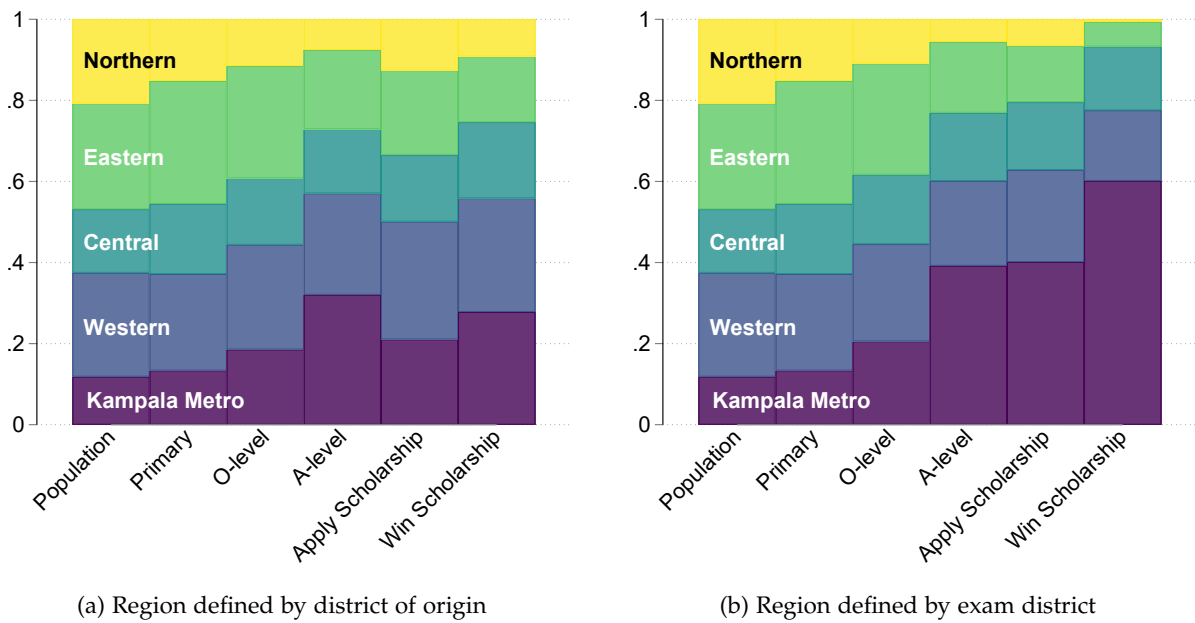


Figure A4: Share by region across schooling levels

Panel (a) defines students' region based on district of origin. For Primary, Lower Secondary, and Upper Secondary, this is inferred as the district where the student sat PLE. For scholarship applications and admissions, district of origin is self-reported by applicants on the PUJAB form. Panel (b) reproduces Figure 2, defining students' region based on the district in which they sat the relevant exam.

A6 Poverty and Post-Primary Educational Attrition

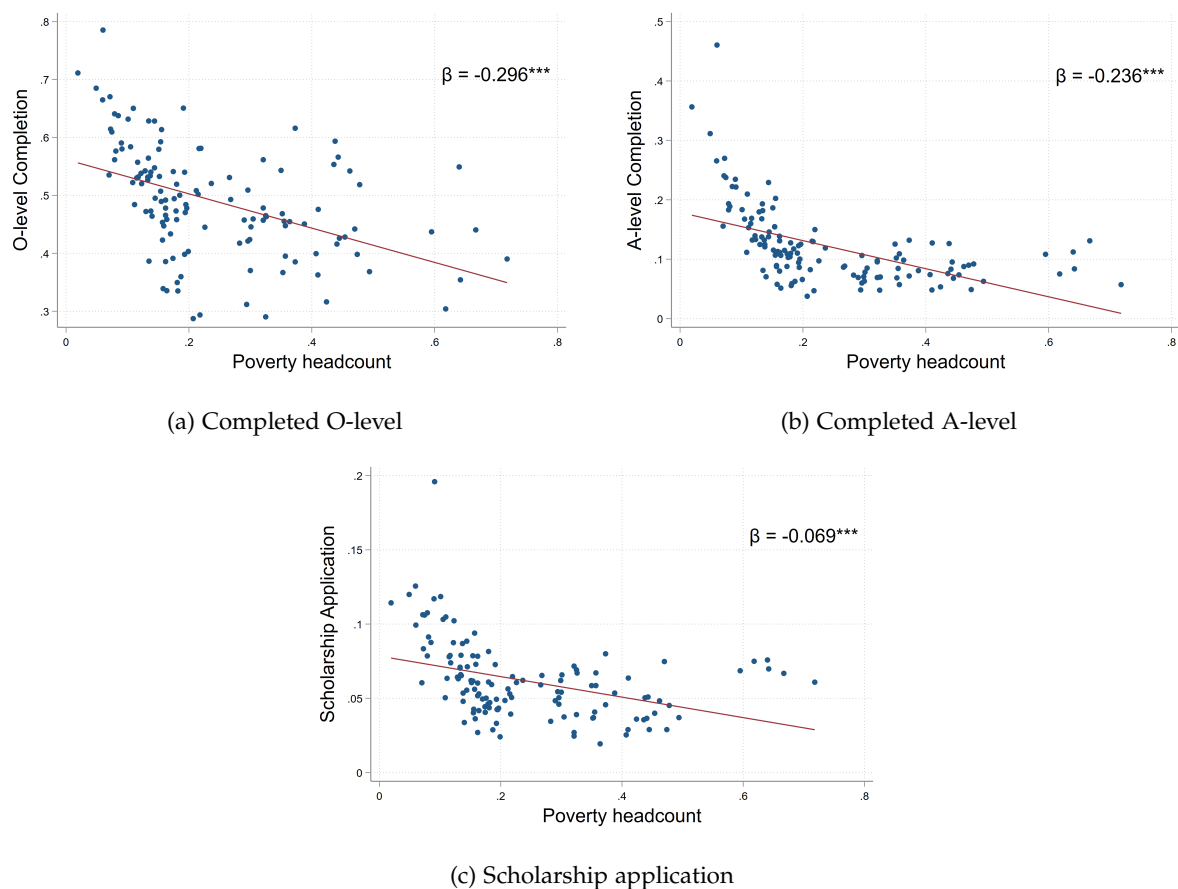


Figure A5: Pipeline retention by district poverty headcount.

Note: Each panel plots the district-level share of PLE candidates who (i) complete O-level, (ii) complete A-level, or (iii) apply for the national merit scholarship against the district poverty headcount.

We use district-level poverty rate, as measured by the Uganda Bureau of Statistics (UBOS), which are small-area estimated poverty headcount rates reported in the Ministry of Finance, Planning and Economic Development's Indicative Planning Figures (Uganda Bureau of Statistics, 2019).

Figure A5 plots the share of PLE candidates who complete O-level, complete A-level, and apply for the national merit scholarship against the district-level poverty rates, and each panel shows fitted slope from a simple district-level regression. The slopes are negative at all three stages, meaning that districts with higher poverty rates experience lower post-primary progression. The scholarship slope is noticeably flatter because application is a downstream margin: poverty has already pushed many students out earlier in the pipeline, so the remaining pool is smaller and more positively selected.

A7 School-level Concentration

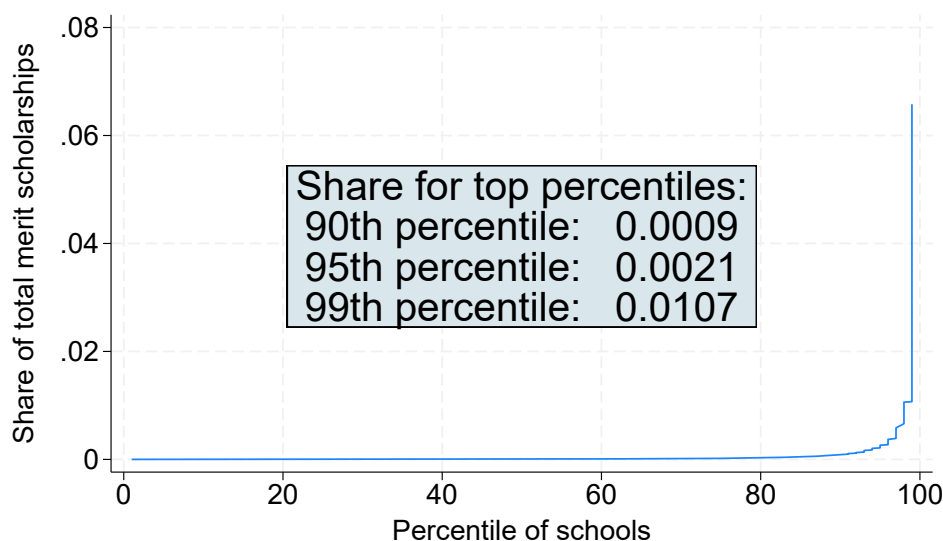


Figure A6: Percentile Plot: Merit Scholarship Across Schools

Note: This figure plots the share of total merit scholarships received by school on the y-axis, with school percentile by share of total merit scholarships on the x-axis. The data include all schools, including those with no scholarship applicants, and the universe of merit scholarships granted for four academic years: 2018-2019, 2019-2020, 2020-2021, and 2021-2022. The label box shows minimum values for the 90th, 95th, and 99th percentiles.

A8 Missed Scholarships

While merit scholarships are awarded based on exam performance, they also result from students' application decisions. Students can apply up to six different majors/universities, and rank these choices by order of preference. Therefore, some students may miss the chance to receive a scholarship not because their exam performance is too low for all available majors and universities, but because they did not apply to the majors/universities for which they could have been awarded a scholarship.

We find little evidence of this: an average of 0.1% of applicants fail to receive any merit scholarship who would have received one if they had applied differently.

If we look within scholarship recipients at whether a student received a scholarship to the flagship Makerere University, the most prestigious university in the country, we find that an average of 14% of applicants do not receive any merit scholarship at Makerere, but would have if they had applied differently. We are careful not to characterize these application choices as errors. Students may have strong preferences for other universities than Makerere, or against the major they could have qualified for at Makerere.

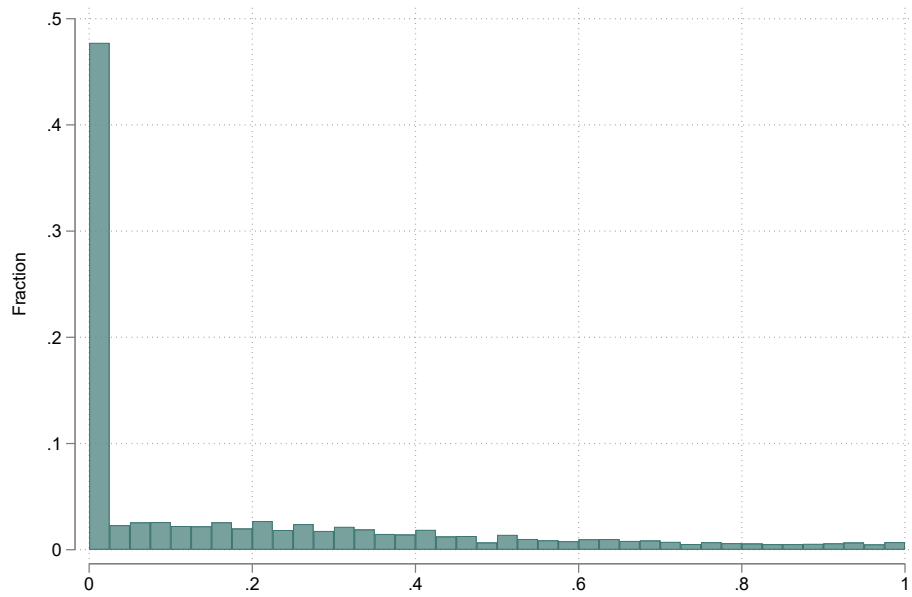


Figure A7: Histogram: Share of A-level School Cohort Applying for Scholarships

Note: This figure shows a histogram at the school $\times$ year level of the share of A-level takers in a school cohort who apply for merit scholarships. Calculated using all students who sat the A-level 2017-2020. Although 47% of school cohorts include zero scholarship applicants, these represent smaller-than-average schools and cohorts. In this same period, 15% of students sat their A-levels at a school from which zero students applied for scholarships.

References

Uganda Bureau of Statistics. 2019. "Indicative Planning Figures (IPFs) for Higher Local Governments (HLGs) for the Uganda FY 2020/21 budget." Uganda Bureau of Statistics. Table 1.2 on pages 1-4.