

**Schooling as a Lottery:
Racial Differences in School Advancement in Urban South Africa**

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ABSTRACT

This paper develops a stochastic model of grade repetition to analyze the large racial differences in progress through secondary school in South Africa. The model predicts that a larger stochastic component in the link between learning and measured performance will generate higher enrollment, higher failure rates, and a weaker link between ability and grade progression. Using recently collected longitudinal data we find that progress through secondary school is strongly associated with scores on a baseline literacy and numeracy test. In grades 8-11 the effect of these scores on grade progression is much stronger for white and coloured students than for African students, while there is no racial difference in the impact of the scores on passing the nationally standardized grade 12 matriculation exam. The results provide strong support for our model, suggesting that grade progression in African schools is poorly linked to actual ability and learning. The results point to the importance of considering the stochastic component of grade repetition in analyzing school systems with high failure rates.

Introduction

Grade repetition is one of the most important problems in educational systems in many developing countries. In sub-Saharan Africa, where the problem is particularly severe, repetition rates are often 20% per grade (Lee, Zuze, and Ross, 2005), contributing both to low average levels of schooling and high schooling inequality. In spite of the wide recognition of the importance of grade repetition, research on the determinants of progress through school remains very limited. The goal of this paper is to advance our understanding of grade repetition by analyzing progress through secondary school in South Africa. More than a decade after the end of apartheid there continue to be large racial differences in schooling outcomes in South Africa. As we will show, grade repetition plays a key role in explaining these differences.

South Africa has almost universal primary school enrollment, with enrollment rates remaining high into the teenage years (Anderson, Case, and Lam, 2001). Ultimate schooling attainment is mostly determined between ages 14 and 22, the years when young people may drop out or fail out of secondary school, may pass or fail their grade 12 matriculation exam, and may or may not go on to post-secondary education. This paper looks at one of the most critical periods in this transition, the period following grades 8 and 9. Using a new panel study of youth collected in Cape Town, we are able to follow students through three years of secondary school. We find large racial differences in grade advancement – 84% of white students who were in grades 8 and 9 in 2002 successfully advanced three grades by 2005, compared to 44% of coloured students and only 32% of African students. While dropping out is one reason for these differences, we show that high rates of grade repetition play a fundamental role. While only 32% of African students in grades 8 and 9 in 2002 had advanced three grades by 2005, 74% were still enrolled in school.

The importance of grade repetition has been pointed out in a number of other developing countries. Gomes-Neto and Hanushek (1994) documented repetition rates of 20-54% per grade in primary school in Brazil. They found that lower student test scores were associated with increased probability of grade repetition, a result consistent with our results below. Jacoby (1994) found that 21% of 7-12 year-olds had repeated at least one grade in Peru. He found that household income and assets reduce grade repetition, concluding that borrowing constraints play an important role. As pointed out by Lee, Zuze, and Ross (2005), grade repetition is an even more serious problem in sub-Saharan Africa than in other regions, with primary school repetition rates of over 20% per grade in many countries. Although the importance of these high rates of grade repetition is widely recognized, research on grade repetition remains limited. This is due in part to data limitations, with few data sets providing direct information on grade repetition. We take advantage of new longitudinal data collected with a strong focus on grade repetition, allowing us to get a clearer picture of this important component of schooling inequality in South Africa.

As a framework for understanding the determinants of progress through school, we develop a stochastic model of grade advancement. From the perspective of a student trying to decide whether to enroll in a given grade and how much effort to invest in school, performance in school in a given year depends on systematic components such as prior learning, student effort, and inputs from home and school, as well as a stochastic component that reflects imperfect links between actual learning and measured performance. We show that high variance in this stochastic component can generate an equilibrium characterized by high enrollment, low effort, and high rates of grade repetition, features that are typical of predominantly black schools in South Africa. We also show that higher variance tends to reduce the impact of variables such as prior learning and household income on the probability of grade advancement.

After developing our theoretical model, we analyze the determinants of grade advancement and school enrollment using a rich set of variables from the Cape Area Panel Study, a recently-collected longitudinal survey of young people in Cape Town. These variables include previous school outcomes, scores on a baseline literacy and numeracy evaluation, and household variables such as income and parental schooling. Our empirical results are highly consistent with our theoretical model. While there is a strong impact of baseline test scores and household income on progress through grades 8-11, the effect is much weaker for African students than for coloured and white students. We interpret this as evidence that the African school environment does a poor job translating ability and resources into measured performance. Also, in line with our model, we find that African students are less likely to drop out of school than coloured students after failing a grade. As a strong test of our model, we show that our results change systematically when we look at pass rates on the nationally standardized grade 12 matriculation exam. The impact of baseline test scores and income are as large for African students as coloured students in predicting pass rates on the grade 12 exam. This suggests that the weaker impact of baseline test scores and income for Africans in grades 8-11 is due to a poor system of evaluation in those grades.

1. Historical Background and Empirical Regularities

A. South African schools and the legacy of apartheid

A series of cross-national standardized tests have shown that South African learners are not internationally competitive (Van der Berg, 2005; Crouch and Vinjevold, 2006). For example, in the comparative international testing program in mathematics and science - TIMSS - South African grade 6 students performed the lowest out of 50 countries (Reddy, 2006). South Africans perform poorly even within Africa (Van der Berg and Louw, 2006). Since the South African population is dominated by non-white groups that were disadvantaged under apartheid, an obvious explanation for this poor performance is that it reflects a lingering legacy of educational inequities

from the apartheid era. Some support for this is found in the fact that a small pocket of white South Africans do very well on these international tests amid otherwise poor aggregate performance. Similar disparities emerge when analyzing grade 12 matriculation exam results, especially in mathematics and science (Van der Berg 2005, Borat and Oosthuisen 2006).

Moving beyond simple descriptions of these disparities to more detailed explanation has proven to be elusive. There is mounting evidence that the disparities are no longer simply a problem of school access or government budget allocations (Fiske and Ladd, 2004; Crouch and Vinjevold, 2006; Van der Berg, 2005). Indeed, in these dimensions the post-apartheid government has achieved major progress and substantial equalization by race. The literature suggests, however, that progress on enrollments and budget equalization has not led to equalization of educational outcomes. One reason for this is that budget allocations provide an aggregate view of educational equalization that masks remaining inequities at the school level. There has been some reduction in the inequality in pupil-teacher ratios that was shown by Case and Deaton (1999) to have an important impact on inequality in schooling outcomes in 1993. Due to large disparities in school fees, however, the equalization of government funding has not fully equalized pupil-teacher ratios and other school inputs (Fiske and Ladd, 2004; Yamauchi, 2005). Although there are greater possibilities to exercise school choice in the post-apartheid environment, constraints facing students are such that most black students are still in schools with poor educational infrastructure.¹

A fair amount of research using an education production function approach has analyzed the role of these input inequities on educational performance (Case and Deaton, 1999; Crouch and Mabogoane, 1998, 2001; Van der Berg, 2005; and Borat and Oosthuisen, 2006). The overriding

¹ Van der Berg (2005) records the beginnings of an increase in within-race inequality in terms of both inputs and outputs as one would expect given increased options for all learners. However, Seloud and Zenou (2003) provide a useful model of this constrained optimization process that shows how hard it is for previously disadvantaged South Africans to improve their schooling through school choice.

