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The post matriculation enrolment decision: Do public colleges provide students with a viable alternative? Evidence from the first four waves of the National Income Dynamics Study

by

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Abstract

This paper uses National Income Dynamic Survey (NIDS) data from 2008-2015, together with administrative data on South African schools and post-secondary institutions, to estimate the impact of home background, school quality and scholastic ability during a learner's final years of schooling on enrolment in post-secondary education. We analyse enrolment patterns for each of three institution types separately, namely public universities, public Technical and Vocational Education and Training (TVET) colleges, and private colleges. In light of government's current policy to expand TVET colleges over the next two decades, we focus specifically on this institutional category. In particular, we investigate the role of financial constraints in the enrolment decision, in order to assess the viability of the plan to expand post-secondary education via the TVET sector. Through a series of multinomial logit regressions, we find that household income during matric year is highly significant in determining enrolment in all types of post-secondary institutions, including TVETs. Individual ability (as measured by numeracy test scores) is also important in explaining enrolment in both universities and TVETs, even after controlling for socio-economic background and school quality variables. These findings suggest that increasing the number of seats available at TVET colleges, without expanding funding opportunities and assessing the level of course content, is unlikely to result in the target of 2.5 million learners in TVET by 2030 being met.

Introduction

More than 20 years after the end of apartheid, South Africa remains one of the most unequal countries in the world. It has been argued that South Africa is caught in an inequality trap that operates in part via access to post-schooling education: Low post-schooling enrolment leads to skill scarcities that ensure high rewards for the skilled and low rewards for the unskilled (Pellicer and Ranchhod 2012). The unskilled thus remain poor and enrolment in post-schooling education remains limited. In this way the cycle of inequality and poverty is perpetuated.

Conventional wisdom on the chief reason for limited enrolment in post-secondary education in South Africa holds that the main barrier is eligibility: Due to differences in the quality of education received at earlier levels of schooling, as well as home environments characterised by limited resources and lack of academic support, matric outcomes are generally poor. Only around half of 25-29 year olds have passed matric¹ (NIDS 2016, GHS 2014). Even among those who do pass matric, a substantial fraction (70%) do not pursue any form of post-secondary education or training, despite the very large rewards to these qualifications in the labour market (See Table 1 and Appendix Table 1). The high cost of post-secondary education, especially university education, could be a reasonable explanation for this anomaly.

Given high returns to post-secondary education in South Africa, an increase in access to post-secondary education could help break this cycle of inequality and poverty. In its 2013 White Paper, the Department of Higher Education and Training (DHET) presents plans to expand the capacity of the post-secondary sector over the next two decades, in order to address these low levels of enrolment, attainment, and associated inequalities. A particular focus is a rapid expansion of the number of public Technical and Vocational Education and Training (TVET) colleges. The South African government has also increased funds available for students attending TVET colleges, primarily through the National Student Financial Aid Scheme (NSFAS). Students whose parents earn below a certain level of income do not have to pay any fees, and they are assisted with accommodation and transport costs (DHET 2013).

For this expansion to have an impact on the structure and reach of the current PSET system, it needs to be accompanied by an increase in enrolment and a widening of access. Thus, we need to understand the current challenges these institutions face. These are reputed to include: Poor management and functioning; a disconnect between course content and the skills demanded in the labour market; confusing course structures and application processes; lack of student support; and funding constraints. In addition, they have a reputation for being inferior institutions that provide a fall-back option for learners who are unable to attend university while, at the same time, the course content of the national certificate vocational (NCV) has been portrayed as too academically challenging (see Branson et al. 2015 for a recent summary). Empirical research into these challenges, particularly at a national level, is growing, but remains fairly limited. We aim to contribute to this literature by assessing the viability of the DHET's policy objective in terms of individual barriers to entry. In particular we ask: To what extent is entry dependent on prior socio-economic status, financial means and/or academic merit?

The decision to enrol in post-secondary education is largely determined by tuition costs and the ability to fund these costs. A large body of international literature shows that family income, home background, and ability all impact on post-secondary enrolment levels, and their relative importance has implications for the effectiveness of funding policies in the higher education arena. Family income can be largely indicative of short-run credit constraints, while home background, or long-term family income (often measured by parental education), is associated with quality of school attended and home environment factors. These will have affected the learner throughout their life

¹ See table 2 and appendix table 2.

and impacted on their schooling outcomes, ability, and desire to continue their education. A number of studies have demonstrated that long-term family background is more important in explaining college attendance than short-term credit constraints (Carnerio and Heckman, 2002; Cameron and Heckman, 2001; Keane and Wolpin, 2001). However, others have used more recent data to show that the effects of family income on college attendance and achievement rates have become more important over time. This may be a result of increasing tuition costs, rising returns to education, and insufficient public funding. Net family wealth, or housing wealth, and the associated availability of credit/collateral, has also been shown to have significant effects on college enrolment, especially amongst poorer households. (Belley and Lochner, 2008; Lovenheim, 2011; Lochner and Monge-Naranjo, 2011).

In a study of urban Cape Town in South Africa, Lam et al. (2013) use longitudinal data to show that large racial gaps in post-secondary enrolment are explained mainly by differences in parental education and high school outcomes, rather than credit constraints (measured by household income during high school years). However, there is still evidence of income effects at the top end of the income distribution, as well as on enrolment levels in non-university programmes.

Using the National Income Dynamic Study (NIDS) data for 2008-2015, this paper takes a similar focus and investigates the relative importance of home background, school quality, ability, and other socio-economic factors on post-secondary enrolment, in particular TVET enrolment. The NIDS dataset provides us with a rich set of socio-economic variables which, when combined with administrative data, allows us to analyse the characteristics of enrolees by institution type. The longitudinal nature of NIDS means that we can control for characteristics at a point when the enrolment decision is being made, prior to actual enrolment. Thus, the study enables an in-depth examination of enrolment patterns at the national level, providing important insights into the factors that influence the enrolment decision and which may have relevant policy implications.

In our descriptive analysis we compare the characteristics of those who have enrolled in universities, TVETs, or private institutions with those who do not enrol at all within two years of matric, in order to identify which sectors of society are currently being served by TVETs and which sectors are being excluded. We see that, while university enrolees tend to come from wealthier households and schools, and have higher academic performance by the end of matric, TVET enrolees do not look so dissimilar in terms of socioeconomic characteristics from those who do not enrol in any post-secondary education. However, when we consider the enrolment decision in a multivariate framework, we find that household income is important in determining enrolment in all institution types, even after controlling for socio-economic factors. In addition, academic merit, as measured by numeracy test scores, appears to be highly significant in determining enrolment in both universities and TVETs. Thus, our results suggest that increasing capacity through expanding the number of TVET colleges will be insufficient to overcome the barriers students face in enrolling in post-secondary education. Alongside this expansion, an even further increase in funding and a re-examination of what level of academic ability is necessary to succeed in TVET courses would be required.

The remainder of this paper is structured as follows: We first provide a brief description of returns to education in South Africa and the current composition of the post-secondary education system. We then move onto our main analysis, where we describe the data and sample, provide a descriptive comparison of the sample according to enrolment in the different post-secondary institution types, and present the results of a multinomial logit regression model, whereby we estimate the impact of income, socio-economic factors and ability on enrolment. Finally, we discuss our findings and conclusions, and provide recommendations for further research.

The South African post-secondary education landscape

Returns to education in South Africa

Employment rates and earnings levels vary substantially by educational attainment and indicate that the returns to education in South Africa are high. Van der Berg and Van Broekhuizen (2012) show that the demand for university graduates in the South African labour market is high, and that the probability of employment for degree-holders has in fact grown over time. They challenge existing research (e.g. Bhorat 2004) that argues that the South African graduate unemployment rate is cause for major concern (Van der Berg and Van Broekhuizen 2012). Using a variety of survey data across multiple time-points, they show that unemployment among those with a certificate or diploma (without a degree) is persistently much higher than among graduates with university degrees, and unemployment is low by international standards for university degree-holders. In addition, their results show that graduates have higher labour force participation rates (as they are less likely to be discouraged work-seekers), and are less affected by economic conditions, than non-graduates.

Table 1 provides the income returns to different levels of education for 25-59 year olds, using the NIDS as a cross section in waves 1-4². The coefficients indicate the income returns to completing a given level of education compared to the next lower level. While returns to a matric are high, completing any post schooling education substantially improves labour market prospects. Thus, low enrolment levels in universities, as well as technical and vocational studies, cannot be explained by low returns in the labour market.

Educational attainment in South Africa

The South African education system is characterised by high enrolment until late secondary school, but relatively low levels of attainment on the critical margins that improve labour market outcomes, with considerable variation across population groups, a strong indicator of wealth in South Africa. Table 2 provides educational attainment rates for 25-29 year-olds for each wave of NIDS³. We see that the percentage of individuals in this age group who have obtained a post-matric diploma or certificate is 19% or lower, while the percentage who have obtained a university degree is even smaller, ranging from 2%-3%. If we look solely at those with a matric, more than half do not go on to complete some form of post-secondary education, and only around 4-6% of matriculants go on to complete a university degree.

The post-school educational system

Analyses of the South African post-secondary education system have focused on qualification type, namely degrees, diplomas or certificates. There is variability however in the level and quality of these qualifications across and within institution type. For example, a TVET diploma is unlikely to provide the same signal to the labour market that a university diploma provides. Similarly, a two-week certificate for on-the-job training is unlikely to be equivalent to a N certificate obtained from a TVET. Data constraints have largely prohibited the examination of within and across institution type differences⁴. NIDS collects information on the institution attended, and therefore allows us to examine differences between TVET, University and other institution types.

² Appendix Table 1 presents similar regressions using data from South Africa's General Household Surveys 2009-2014.

³ Appendix Table 2 presents a similar table using General Household Survey (GHS) 2009-2014 data. It also includes the percentage of grade 12s who do not go further, but have an exemption.

⁴ Graduate Destination Studies aim to examine the life trajectories of graduates but have, to date, been plagued by low response rates (Branson et al., forthcoming). These studies also have limited information on

The post-school educational system in South Africa consists of public universities, public technical vocational education and training (TVET) colleges, adult education and training centres, private post school institutions (including colleges, adult learning centres, and private TVETs), and work-based training institutions (both private and public). Although private institutions are important for filling niche areas not covered by public education (such as design and fashion), there is currently no reliable, centralised database for this sector and, as a result, a lack of research around its functioning and structure. Private institutions also vary largely in terms of size, structure, and quality, making it difficult to analyse them as a homogeneous group. In this paper we acknowledge that private institutions currently constitute a part of the post-secondary sector, but we do not focus on them specifically, nor do we attempt to assess their viability as an alternative to universities or TVETs.

South Africa has 26 public universities⁵ - these include traditional universities, universities of technology (which focus primarily on technical and vocational skills), and 'comprehensive' universities, which are a mix between traditional universities and universities of technology. Learners can acquire the full range of qualifications at universities, including degrees, diplomas, and certificates. (Branson and Hofmeyr, 2015). Entrance requirements at universities are high compared to other types of institutions: Learners require at least an NSC with a bachelor's pass to apply to traditional universities, and at least an NSC with a diploma to apply to universities of technology.

Public TVET colleges, on the other hand, focus on the provision of vocational or mid-level skills, mainly in areas of engineering, construction, tourism, hospitality, and general business and management. Qualifications include the National Curriculum Vocational (NCV) programme, which was originally introduced to replace the N programme (Nated programmes). This is intended to equip learners with a mixture of vocational and academic skills, as well as provide a bridge for learners wanting to advance into universities. There are 50 public TVET colleges in South Africa, with more than 264 campuses around the country⁶. Learners can obtain diplomas and certificates at TVETs but not degrees, which may be a reason why they are less highly regarded academically than universities. They are also far more accessible than universities in terms of entrance requirements: There is no minimum NSC pass requirement, and learners with a completed grade 9 can enrol in TVET colleges. Nevertheless, we see lower levels of enrolment in these institutions compared to universities (Table 3 and 4).

Participation in post-secondary education

Table 3 presents the participation rates of 15-24 year olds with at least grade 9 who are not enrolled in school, by institution type, based on data from the General Household Survey (GHS) for 2009-2014. Participation rates have remained remarkably stable between 2009 and 2014, at around 16%. Restricting the sample to matriculants only in table 4, participation increases to 25%. Of note is the proportion enrolled in a public university or university of technology, which is consistently higher than the proportion enrolled in a public college, although the gap has decreased over time.

Given that only 50% of South Africans complete matric (see table 2) and, of those who do, very few are eligible to go to university, TVETs would appear to be the logical alternative. However, with only around 26% of post-secondary enrolment in TVETs (see table 3), the current enrolment composition suggests that this is not the case. In its 2013 White Paper, the DHET state their main focus to be on an expansion of TVET enrolment levels, well beyond the enrolment levels at public universities. Their goal is to have 2.5 million enrolments in TVETs by 2030, an almost 4 fold increase from 2012 levels,

student entry characteristics. Besides localized studies, such as the Cape Area Panel Study, that focus specifically on the transitions of youth, no South African household surveys have sufficient focus or size to examine post-secondary enrolment by institution type.

⁵ <http://www.universitiessa.ac.za/public-universities-south-africa>

⁶ http://www.fetcolleges.co.za/Site_Public_FET.aspx

while only expanding 2012 public university enrolment by 70% to 1.6 million in 2030 (DHET 2013). Tables 3 and 4 do show an increase in the proportion enrolled in TVETs over time, which may already be reflecting the DHETs efforts to expand this sector thus far. However, this expansion appears to be due to enrolment shifts away from both universities and private institutions, rather than a decrease in the proportion not enrolled in any post-secondary education. To increase post-secondary enrolment levels overall, a change in the enrolment composition will not be enough; attention will need to be focussed on the group who are currently not participating in any post-secondary education at all. In this paper, we look specifically at a subset of this group, matriculants, and how their characteristics differ from those who enrol in either university or TVET. We attempt to understand why these matriculants are not participating in post-secondary education, particularly in TVET colleges, which are far more accessible than universities, in terms of entrance requirements and tuition fees, and offer skills sets that are in high demand in the labour market.

Understanding the post-secondary enrolment decision

Description of data

We use the first four waves of NIDS data in our analysis. Wave 1 data was collected in 2008, Wave 2 in 2010/2011, Wave 3 in 2012, and Wave 4 in 2014/2015. In each wave, all adults currently residing in the household are administered an adult questionnaire, and a child questionnaire is administered to the main caregiver(s) of all resident children (aged 15 years and younger). Both of these individual-level questionnaires collect information on education for the current interview year as well as the previous year, and in Wave 1 a numeracy test was administered to 12-59 year-olds (who agreed to write the test). In addition, in each wave, a household level questionnaire is administered to the household head.

The focus of the analysis is to understand the factors that help or hinder enrolment in post-secondary education. We face the same small sample data challenges experienced by others interested in post-secondary enrolment at the national level: Only 50% of grade 1 entrants complete grade 12 and only 25% of matriculants enrol in post-secondary education (see table 4). Answering this question using a national dataset that is not focused on youth is therefore not optimal. In addition, an analysis of this type requires socioeconomic information prior to the post-secondary enrolment event. With four waves of data spanning eight years, and rich socioeconomic data, NIDS provides some good building blocks. We construct the analysis sample to maximise our pool of matriculants and focus on NIDS respondents who have survey information both for their matric year and subsequent information within two years of matric⁷. The analysis sample therefore includes individuals younger than 30 years of age who were in matric at some point during the four waves of the survey, and were seen again in the survey within the two years following their matric. Individuals who matriculated in 2007 (but were only interviewed in 2008) were also included.

Appendix Table 3 shows the proportion of individuals by matric year who were seen within the two years following their matric. Attrition is fairly low overall, with a follow-up rate of 82%. Over the years 2007-2014, a total of 2,909 individuals were in grade 12 and 2,390 were seen in the two year period after their matric. Out of these 2,390 individuals, 72% were seen two years after their matric year and the remaining 28% were seen one year after their matric year. Those who matriculated in 2014 could only be seen one year later during the Wave 4 2015 interviews. The table presents a

⁷ Again, we restrict the sample to those who enrolled within 2 years to maximize the sample without allowing differences in the time to enrolment. Note that this analysis therefore addresses a particular question – factors related to enrolment within 2 years. It is possible that those who enroll 3 or more years after matric face different constraints. This is however beyond the scope of this paper.

breakdown of the sample by income tercile. It is evident that individuals from the middle-income and richest group are more likely to be seen only one year after their matric year, compared to their poorest counterparts. Appendix Table 7 compares the characteristics of those in the sample to those who are not seen within two years. The differences in characteristics reflect the pattern of attrition seen throughout the first four waves of NIDS, whereby individuals from the richer income groups are more likely to drop out of the survey.

Socioeconomic indicators at the time an individual is leaving school are expected to have an impact on whether they enrol in post-secondary education or not. Parental education is usually used as a proxy of long-term socioeconomic status, given that it can be assumed to be time invariant. Household income constraints at the point of exiting school, as well as other characteristics of the matriculant's household, can play a vital part in this decision. NIDS, due to its longitudinal nature, allows us to observe socioeconomic information at this critical point in a young person's life. We therefore construct baseline socioeconomic information for an individual based on their matric year, or a year prior to the matric year when the survey year did not align with the respondent's matric year⁸. Appendix Table 5 provides a summary of the gap between the individual's matric year and their 'base' year, which is the year in which their household income data was collected. For 38% of individuals we use household income data from their matric year, with an additional 30% of individuals assigned the income data from the year prior to matric. The remaining, 12% have income data 2-5 years prior to matric, and 20% have income data one year after the matric year.

NIDS collects information on the name and location of educational institutions (both school and post-secondary) that respondents attend, as well as the geographical location of households in each wave. We supplement these data with administration data from the National Senior Certificate Examinations (NSCE) and a list of South African Tertiary Campuses. The NSCE data includes information on matric results by subject and gender for all government schools for the years 2010-2013 and, for the purposes of this analysis, is used as an indicator of school quality. This school-level data was linked to the NIDS data using national EMIS number and matriculation year. The national EMIS numbers are school-level identifiers assigned by the government, and are included in the NIDS secure data by matching on the individual's school name and location. As the NSCE data only includes results for 2010-2013, individuals who matriculated in years 2007-2009 were assigned matric results of their school in 2010 and, similarly, individuals who matriculated in 2014 were assigned results of their school in 2013. This was done under the assumption that matric results would not vary substantially within three years for a particular school. Approximately 16% of our sample could not be matched to the NSCE data using their school information.

The list of South African Tertiary Campuses contains all public post-school institutions in South Africa. The data includes campus-level location and contact information, including GPS co-ordinates. In addition, each institution is categorised under one of three college types: Technical Vocational Education and Training (TVET) College, University, or University of Technology. Merging NIDS post-secondary institution data to these data therefore allows us to look at the different types of post-secondary institutions that individuals enrol in, as well as distance between these institutions and the individuals' residences in matric. Merging the NIDS data to the SA Tertiary Campuses data was done using a string matching method. The unmatched records were then matched manually to the list of SA Tertiary Campuses. The institutions that were matched to this data were classified as either a public university (including both universities and universities of technology) or a public TVET college. Based on online searches, the remaining records were categorised as private colleges,

⁸ For a subset of respondents (20%) we only have baseline information one year out of matric. For this group we ensure that post-secondary enrolment is two years after matric to avoid using information affected by the post-secondary enrolment event.

private TVETs, adult education training centres, or secondary schools. The adult training centres and secondary schools were reclassified as missing for the purposes of our analysis, and the private colleges and TVETs were grouped together to form a third category, 'other'. However some of these 'other' institutions were difficult to classify, as they did not always have official websites (such as nursing colleges and social enterprises). Therefore, this category includes a fairly diverse range of non-public institutions, from wealthy private colleges to semi-formal training centres, which are likely to vary in size and quality.

Descriptive statistics

In our analysis we look at the impact of individual, home-background, and school level characteristics at baseline (i.e. the closest year to the individual's matric year for which we have socio-economic data) on enrolment in our different post-secondary institution types. After restricting to matriculants seen within two years of matric in the panel, our sample consists of a total of 2,319 individuals. Of these, 226 are enrolled in university, 215 are enrolled in a public TVET, 208 are enrolled in another type of post-secondary institution (the 'other' category), and the remaining 1,670 are not enrolled in any form of post-secondary education within two years after matric. As discussed, the 'other' institution category consists of a fairly diverse range of private post-secondary institutions. We therefore do not attempt to draw conclusions from the results for this category.

Table 4 provides a summary of means, standard deviations, and sample (N) values⁹ for our sample's characteristics at baseline, by institution type. There is some variation in demographic make-up. The mean age at baseline is highest for the non-enrolled group, at almost 19 years. This suggests that people who repeat grades during their schooling, and therefore complete their matric later than expected, are less likely to enrol in any form of post-secondary institution. The TVET enrolees have a mean baseline age of 18.42 years, which is slightly lower than the non-enrolled group. However, it is also above the expected age in matric (which should be 17-18 years), suggesting that TVET enrolees also experience some grade repetition. University enrolees, in comparison, have a mean age of 17.71 years, which is far closer to the expected average age in matric, suggesting that this group of learners are unlikely to have repeated a grade by the time they finish secondary school. Looking at population group, we see that Africans have the highest representation in TVETs, while whites are most highly represented in universities. Overall, the racial composition of the non-enrolled group is not so dissimilar from the TVET group, especially when compared to the composition of the university group.

Next we look at home environment variables at baseline, including household size, composition, and income, and parental education. Once again, the TVET and non-enrolled groups look fairly similar in comparison to the university enrolees. TVET enrolees come from households that are slightly smaller in size, and have only slightly higher income and parental education levels than the non-enrolled group. University enrolees come from smaller households, have household incomes that are over three times higher, and parental education levels over 2.5 years higher, compared to both the TVET and non-enrolled groups.

The TVET enrolees and non-enrolled group also have fairly similar geographical origins, with fairly equal proportions coming from urban and traditional (rural) areas respectively. University enrolees, on the other hand, are more likely to come from urban areas, with less than a third coming from rural areas. Looking at the median distance from baseline household to the learner's school, we see

⁹ Note the sample sizes differ across variables because not all variables are in both the adult and proxy questionnaire (a proxy questionnaire is completed on behalf of adults who are unavailable or unable to answer their own Adult questionnaire), due to item non-response, and because some information (e.g. educational expenditure) was only collected for the year prior to the survey year.

that TVET enrolees and those who do not enrol for post-secondary studies, attend secondary schools relatively close to their homes, compared to those who enrol in university.

The next section of the table summarizes individual school outcomes and expenditure information. The numeracy test scores come from Wave 1 (2008) of the NIDS data. In Wave 1, all 12 to 59 year olds were given the option to write a short numeracy test. There were 4 versions of the test, ranging in difficulty from level 1 (easiest) to level 4 (hardest). Respondents were assigned a particular level based on the highest grade they had reached in mathematics. However, in some cases, respondents opted to write an easier or harder test than the test assigned to them. Note that only 875 individuals, or 38% of our sample, have a test score. This is because, firstly, many individuals refused to write the test and, secondly, part of our sample consists of individuals who were not part of Wave 1. The test scores are provided only as z-scores in the data.

As one would expect, the average numeracy z-scores are highest for the university enrolees (0.002), followed by the TVET enrolees (-0.133), and lowest for the non-enrolled group (-0.545). One is able to compare the scores of TVET enrolees with scores of the non-enrolled group more confidently, as they tended to take tests of a similar difficulty level (relative to the maths grade they attained), and also had similar test completion rates. The result that TVET enrolees score higher on their tests compared to the non-enrolled group is important, as it suggests that individual mathematical ability, as measured at the end of secondary school, plays a role in TVET enrolment. Note that at this point we do not claim that these scores are a reflection of either scholastic or innate ability (or both), and it is likely that they are influenced by a variety of individual, school quality, and home background factors. In our regression analysis below we attempt to separate out these different effects in more detail.

The grade repetition trends mirror those for average age, as discussed earlier. University attendees are least likely to have repeated a grade (only 21% have repeated a grade by their matric year), while those not enrolled are most likely to have repeated a grade (61% have repeated a grade at least once). Those who enrol in TVETs are slightly less likely to have repeated a grade, compared to the non-enrolled group, with 53% having ever repeated. The highest maths grade reached is highest for those with university qualifications, and is slightly higher for the non-enrolled group, compared to TVET enrolees, however the variations are small. As one would expect, school fees and expenditure levels are notably higher for university enrolees, suggesting that learners who can afford to attend more expensive schools, and have more money invested in their education overall, are more likely to enrol in university. The average school fee for TVET enrolees is slightly lower than for those not enrolled, yet not dissimilar. However, total school expenditure for TVET enrolees is far higher (at almost twice the amount of the non-enrolled group), which could be a reflection of parental willingness to invest more in their children's education.

The final section of the table presents a summary of school level characteristics for the different groups, based on the secondary school attended during matric year. The results show that both TVET enrolees and those not enrolled are more likely to have attended schools of poor quality, compared to university enrolees. Pass rates and average maths and English scores are fairly similar for TVET enrolees and the non-enrolled group, in comparison to university enrolees, who have higher pass rates and scores on average. The distribution of schools across former education departments are also not so dissimilar for the TVET enrolled and non-enrolled groups. However, one should be wary of the small sample sizes here. The ex-department of education variables indicate the department which governed the school under apartheid¹⁰. Government resources were

¹⁰ DET = Department of Education and Training (formerly black schools); HOR = House of Representatives (formerly coloured schools); HOA = House of Assembly (formerly white schools); HOD = House of Delegates (formerly Indian schools); New = New Education Department Schools (established 1994 onwards)

distributed highly unequally between departments, and many schools that fell under ex non-white departments still suffer from these historical disadvantages. Thus, the ex-department of education variables can be used as indicators of school quality to some extent. As with geographical location of household, university enrollees are more likely to have attended a school in an urban area, while TVET enrollees and those not enrolled are more likely to have attended a rural school.

Table 6 summarises costs, funding, and distances associated with the different institution types. Bearing the small sample sizes in mind, Table 6 shows that university tuition fees are more than double those of TVETs, while average total educational expenditure on university is around three times the average for TVETs. Thus, TVET fees make up a greater proportion of total expenses, compared to university fees. Financial constraints are therefore likely to be important in explaining enrolment gaps between these two institution types. It is also worth noting that the average TVET educational expenditure (almost R12 000 in total) is not insubstantial, even for households with average income levels. This is important, considering that full funding for TVETs is restricted to the poorest households. Around 32% of TVET enrollees have been awarded some form of bursary or scholarship, which is slightly less than awards to university enrollees. However, we cannot differentiate between merit and means based funding here. Finally, those who attend TVETs are on average further away from all institution types in the year they matriculate, making the cost of migrating to attend post-secondary education higher.

Our interest is in the relationship between income constraints, academic eligibility, and the post-secondary enrolment decision. Bearing in mind that only 38% of respondents (about 900) have test score information, Figure 1 shows the distribution of standardized scores by household income tercile. While the differences are not dramatic, the scores for the top income tercile (tercile 3) are highest, followed by the middle tercile (tercile 2) and the lower tercile (tercile 1) respectively. In the next three graphs (one per institution type) we look at enrolment levels by test scores, for each income tercile, and overall. University enrolment has a clear positive relationship with the test scores overall. The relationship between score and university enrolment is fairly linear for the richest income group, with enrolment higher at each score level than those in the middle or lowest income group. The relationship between enrolment and test score is most noteworthy in the low income group. In this group we see close to zero enrolment until two standard deviations below the mean, a gradual increase until about one standard deviation from the mean, thereafter enrolment increases rapidly, with score reaching levels similar to those in the richest group by score levels 1.8 sd above the mean. Interestingly, we see no relationship between enrolment and test scores in the middle income group. These difference in patterns of enrolment for income groups could be explained by current funding policies. These dictate that those in the middle of the income distribution miss out on educational opportunities, as their incomes are not low enough to qualify for means-based government funding but, at the same time, are not high enough to qualify for private loans (the 'missing middle').

The graph for TVET enrolment by scores also shows a rise in enrolment with higher scores. However, the trends by tercile reflect different patterns. Unlike university enrolment, for the middle-income tercile, enrolment in TVETs increases with higher scores, adding credence to the 'missing middle' university enrolment theory. Enrolment levels for the richest tercile first increase and then decrease. This likely reflects that when scores are above a certain level, learners choose to enrol in university instead of TVETs - a pattern seen within the high scoring lowest tercile learners too. Finally, enrolment levels in TVET are low across scores for the poorest income group, suggesting that credit constraints may be preventing capable individuals from enrolling in TVET colleges.

The third graph in this series shows enrolment in other institutional types by score. The spiky pattern likely reflects the heterogeneity of this group. However, overall, the proportion enrolled in other institutions does appear to fall as test scores rise.

Regression analysis

Table 7 presents the results for six multinomial logit regressions. The dependent variable is institution type (university, TVET, other, and not enrolled), and the explanatory variables consist of the individual, household, and school level characteristics described in the section above. Our base category for the dependent variable in all regressions is the non-enrolled group. The coefficients thus indicate the relationship between the explanatory variables and enrolment in a particular institution type, compared to not enrolling in any form of post-secondary education. The first regression includes school outcome only, which is proxied by the grade repetition dummy and highest maths grade reached. In the second regression we add log per capita household income and, in each subsequent regression, additional controls are added, including demographics and school and household level characteristics.

In the first two regressions, the dummy variable for “ever repeated” is highly significant in explaining enrolment in all three institution types. The results indicate that having repeated at least one grade during school reduces the probability of enrolling in any kind of post-secondary education, and more so for university than other institution types. Grade repetition becomes insignificant for TVET and other enrolment when other socio-economic controls are added, suggesting that there is no direct relationship. In other words, grade repetition may be a by-product of coming from disadvantaged home backgrounds and attending poor schools. This finding is also consistent with evidence that shows that grade repetition is a noisy signal of educational ability in South Africa, in particular in poorly resourced schools (Lam et al. 2011).

Household income in matric year is strongly related to enrolment in any institution type, even after controlling for other socioeconomic and school-level characteristics. The coefficients are higher for university enrolment compared to TVET enrolment, suggesting that household income is a more important factor in determining university enrolment than TVET enrolment. This is not surprising, considering that universities have the highest tuition fees. Thus, the results suggest that short-term family income is important in the enrolment decision, over and above long-term family wealth (proxied by parental education) and school quality. Note that the income coefficient for explaining TVET enrolment generally decreases in magnitude as we add in the controls. This is likely due to the correlation between short-term income and the demographic, home background, and school level variables. Nevertheless, the fact that short-term income remains significant throughout is of most relevance to our analysis, as it provides strong evidence that matriculants who come from families with low levels of family income will be less likely to enrol in TVETs.

In Table 8 we rerun the six regressions with the addition of the numeracy test scores and an indicator for the absence of test score information¹¹. When controlling for demographic, home background, and school level factors, one could argue that the scores reflect the impact of individual ability on enrolment to some extent. Interestingly, along with grade repetition, the test scores are highly significant in explaining enrolment in both university and TVETs, as opposed to not enrolling in any post-secondary institution. Furthermore, they remain significant even when adding in income, socioeconomic, and school-level controls. The scores however are not significant for the ‘other’ category, perhaps due to the heterogeneity in this group. These results suggest that individual ability, *independent of home background and school quality measures*, is important in post-secondary enrolment for both University and TVET.

¹¹ Appendix Table 7 replicates the results restricting the sample to those with test scores only. We find substantively similar results to those presented in Table 8.

When household income is added, the coefficient on the scores for university enrollees falls slightly, while for TVET enrollees it remains unchanged. In other words, some of the relationship between ability and enrolling in university is explained away by household income, but not for enrolling in TVETs. This continues as home background and school variables are added, such that the score coefficients for the university and TVET groups gradually converge.

Discussion and conclusion

The following results from our analysis should be highlighted:

1. In terms of average baseline socio-economic characteristics, TVET enrollees do not look substantially different from those who do not attend any form of post-secondary education within two years of finishing school. Their test scores are, however, higher.
2. Household income during matric year is highly significant in explaining enrolment in universities and TVETs, even after controlling for longer run socio-economic background and school quality variables.
3. Individual ability (as measured by the test scores) is also important in explaining enrolment in both universities and TVETs, even after controlling for socio-economic background and school quality variables.

These are important results for a number of reasons. Firstly, the finding that short-term credit constraints are a significant factor in explaining enrolment in TVETs (and universities) suggests that current funding opportunities are insufficient. Thus, increasing enrolment capacity at TVETs will not be enough to increase enrolment headcounts. Secondly, while a simultaneous increase in funding opportunities is clearly needed, it will not necessarily solve the problem of low TVET enrolment levels, given that learners who enrol in TVETs are currently of higher ability levels than those who do not enrol. This finding suggests that learners with lower levels of ability or school outcomes are currently being excluded from TVETs. If these institutions are being evaluated according to their students' success rates, it is possible that TVETs are purposefully selecting the highest achieving learners from schools in order to improve overall outcomes. Alternatively, it could be that learners with lower levels of scholastic ability are not as motivated academically, and are less likely to enrol in an education sector that is difficult to understand, and is relatively unknown and less highly regarded within the post-secondary system.

While our analysis does not focus directly on the current debate surrounding free university education, our findings do hold some relevance in relation to this issue. Our multivariate analysis shows that credit constraints do bind in the decision to enrol at university. However, two additional pieces of information in the descriptive tables suggest that directing funds towards free university education may have a more limited impact on total post schooling enrolment numbers. First, in Table 5, we show that average household incomes in matric for those who enrol in university are over three times the incomes¹² of those who enrol in TVET or do not enrol in post-secondary education. Free university education would therefore primarily be a transfer to the wealthier segments of society. Second, Appendix Table 2 shows that of those 25-29 year olds who have attained grade 12 or higher, only around 8% have a matric exemption as their highest level of education, indicating that the vast majority of matriculants achieving exemptions, the requirement for entry into most university courses, go on to complete a college or university qualification. Therefore alleviating the financial constraint would have a limited impact on expanding the number of students enrolled in post-secondary education (although it may shift the distribution between

¹² Note the lower 95% confidence bound on the university estimate is twice the higher bound on the TVET estimate.

TVET and university) and hence on national education attainment levels. Our findings suggest that it would be more effective in terms of equity to direct funds towards University and, in particular, TVET bursaries, as well as to improve the match between the skill set of the school leaving population and the level of academic preparedness required for college entry, both of which are critical for ensuring an effective and socially-beneficial expansion of this sector. That being said, we recognise that these findings abstract away from the supply side challenges faced by the TVET sector, which if not dealt with, would limit, if not eliminate, the effectiveness of these suggestions.

Recommendations for future research

1. In this paper we look only at enrolment levels. With additional waves of data we will also be able to look at success rates in both universities and TVET colleges.
2. As our panel of enrolees progress through college, it will be important to monitor how TVET graduates are being absorbed into the labour market, via their employment rates and earnings. This will help to assess the degree to which there is a shortage of mid-level skills in the economy, as well as which particular skills categories are in high demand. Coding all post-school educational institutions in NIDS will be invaluable to this process.
3. More detailed information on matric results will be valuable for analysing the impact of secondary school outcomes on post-secondary enrolment more accurately, particularly with regard to selection criteria.

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Table 1: Returns to education level for 25-59 year-olds

Educational level	NIDS W1	NIDS W2	NIDS W3	NIDS W4
Grade 10	0.361***	0.270***	0.0155	0.250***
	[0.079]	[0.081]	[0.065]	[0.060]
Grade 11	-0.0768	0.112	0.271***	0.0556
	[0.068]	[0.069]	[0.056]	[0.051]
Grade 12	0.660***	0.495***	0.410***	0.418***
	[0.059]	[0.059]	[0.049]	[0.042]
Post-matric diploma/certificate	0.498***	0.332***	0.398***	0.442***
	[0.050]	[0.047]	[0.039]	[0.034]
University degree	0.637***	0.738***	0.747***	0.843***
	[0.067]	[0.063]	[0.053]	[0.047]
Observations	2,486	2,894	3,520	4,759
R-squared	0.588	0.526	0.530	0.508

Data Source: NIDS, Waves 1-4.

Notes: Post-matric diploma/certificate includes a certificate or diploma that requires a Grade 12 qualification. University degree includes a bachelor's degree, bachelor's degree and diploma, honours degree and higher degree (Master's, Doctorate), from traditional universities, comprehensive universities, and universities of technology. Standard errors in brackets; significance levels: *** p<0.01, ** p<0.05, * p<0.1; regressions are restricted to individuals aged 25-59 for each wave; regressions also include race, age, age squared, gender, dummies for grades 1-9, and province dummies; the coefficient is the return relative to next lower level – thus, the coefficient on university degree is the extra returns from this level of education relative to a post-matric diploma/certificate; post stratification weights are used for each wave.

Table 2: Educational attainment of 25-29 year-olds

Educational attainment	NIDS W1	NIDS W2	NIDS W3	NIDS W4
Less than grade 9	18%	13%	13%	9%
Grade 9	10%	9%	7%	9%
Grade 10	12%	12%	12%	12%
Grade 11	19%	18%	19%	21%
Grade 12	29%	32%	31%	27%
Post-matric diploma/certificate	10%	13%	17%	19%
University degree	3%	2%	2%	3%
At least grade 12	42%	48%	50%	49%
Beyond grade 12	13%	16%	19%	22%
% of grade 12s going further	31%	33%	38%	44%
% of grade 12s completing university degree	6%	5%	4%	6%
Observations	1780	2098	2614	3059

Data Source: NIDS, Waves 1-4(2008-2015)

Notes: Post-matric diploma/certificate includes a certificate or diploma that requires a Grade 12; university degree includes bachelor's degree, bachelor's degree and diploma, honours degree and higher degree (Master', Doctorate), from traditional universities, comprehensive universities, and universities of technology; post stratification weights are used for each wave.

Table 3: Enrolment in higher education for 15-24 year-olds with grade 9 by year, 2009-2014

Educational enrolment	2009	2010	2011	2012	2013	2014
% not enrolled	84%	85%	85%	84%	84%	83%
% enrolled in Public University or University of Technology	7%	6%	7%	6%	7%	7%
% enrolled in Public college	3%	3%	3%	5%	5%	5%
% enrolled in Private University or University of Technology	4%	3%	3%	2%	2%	2%
% enrolled in Private college	3%	2%	2%	3%	2%	2%
Observations	7645	8677	7809	7610	7813	7597

Data Source: General Household Survey, 2009-2014.

Notes: All individuals aged 15-24 with at least a Grade 9 but who are not currently enrolled in school, adult education/training, literacy classes or home schooling, are included; post stratification weights are used for each year.

Table 4: Enrolment in higher education for 15-24 year-olds with a matric or above by year, 2009-2014

Educational enrolment	2009	2010	2011	2012	2013	2014
% not enrolled	75%	77%	76%	76%	77%	75%
% enrolled in Public University or University of Technology	12%	10%	11%	10%	12%	12%
% enrolled in Public college	4%	4%	5%	6%	6%	6%
% enrolled in Private University or University of Technology	6%	5%	5%	4%	3%	3%
% enrolled in Private college	4%	4%	3%	4%	3%	3%
Observations	4317	5018	4476	4297	4481	4509

Data Source: General Household Survey, 2009-2014.

Notes: All individuals aged 15-24 with at least a Grade 12 are included; post stratification weights are used for each year.

Table 5: Entry characteristics by institution type

Entrance characteristics	University (N=226)			Public TVET (N=215)			Other (N=208)			No Post Schooling (N=1670)		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Demographics:												
Age in matric year	17.711	1.586	226	18.428	2.294	215	18.173	1.925	208	18.922	2.398	1670
Female	0.581	0.494	226	0.575	0.495	215	0.678	0.468	208	0.546	0.498	1670
African	0.726	0.447	226	0.949	0.220	215	0.920	0.272	208	0.884	0.321	1670
Coloured	0.091	0.288	226	0.044	0.206	215	0.007	0.086	208	0.063	0.242	1670
Indian	0.042	0.200	226	0.001	0.029	215	0.014	0.119	208	0.028	0.165	1670
White	0.141	0.349	226	0.006	0.076	215	0.058	0.235	208	0.026	0.159	1670
Home (in matric year):												
Household Size	5.078	2.439	226	6.027	2.575	215	5.499	3.392	208	6.369	3.450	1670
Number age 6-18	1.968	1.275	226	2.175	1.265	215	2.028	1.541	208	2.267	1.674	1670
Number age 19-22	0.506	0.709	226	0.704	0.771	215	0.802	0.792	208	0.965	0.843	1670
Grant income	0.387	0.488	226	0.662	0.474	214	0.478	0.501	206	0.647	0.478	1662
Household income	3786.32	5310.23	226	1140.49	2060.40	215	2198.18	3644.32	208	972.43	1752.73	1670
Mother's education	10.410	4.207	222	7.824	3.864	209	9.414	3.901	201	7.149	4.308	1609
Father's education	10.421	3.827	145	7.707	4.431	137	8.874	4.349	125	6.593	4.693	934
Geographical type:												
Traditional	0.306	0.462	226	0.478	0.501	215	0.304	0.461	207	0.507	0.500	1670
Urban	0.679	0.468	226	0.506	0.501	215	0.692	0.463	207	0.466	0.499	1670
Farm	0.014	0.120	226	0.016	0.126	215	0.004	0.064	207	0.027	0.163	1670
Proximity to school in matric:												
Distance to school attended*	4.598	200.84	194	2.179	1060.70	182	3.662	641.85	166	2.865	414.47	1445

*The median rather than the mean has been reported for this variable, for all categories.

	University (N=226)			Public TVET (N=215)			Other (N=208)			No Post Schooling (N=1670)		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Entrance characteristics												
Individual educational outcome and expenditure:												
Numeracy Z-score	0.002	0.990	93	-0.133	0.825	81	-0.358	0.859	70	-0.545	0.926	631
Test difficulty level relative to required	0.127	0.512	93	-0.110	0.757	81	-0.211	0.842	70	-0.110	0.886	631
No test completed	0.538	0.500	226	0.527	0.500	215	0.561	0.497	208	0.506	0.500	1670
Ever repeated	0.213	0.411	222	0.527	0.500	212	0.532	0.500	203	0.606	0.489	1644
Highest grade took maths	9.985	2.930	222	9.414	3.274	210	10.190	2.306	206	9.662	2.842	1633
School fees	3696.05	6516.29	201	568.19	1482.16	187	2264.64	4430.71	183	610.76	2307.44	1402
No school fees paid	0.343	0.476	143	0.688	0.465	151	0.487	0.502	119	0.599	0.490	1027
Total school expenditure	5095.43	8442.25	146	2806.59	5992.23	147	3819.89	6110.07	135	1489.96	3389.77	1107
Matric School characteristics:												
% of matriculants that wrote the exam	0.975	0.036	187	0.955	0.131	183	0.974	0.041	168	0.965	0.067	1408
% who passed of those who wrote	0.813	0.200	187	0.679	0.194	182	0.705	0.197	168	0.656	0.219	1407
% of entrants who pass	0.796	0.205	187	0.650	0.209	183	0.688	0.199	168	0.636	0.221	1408
% who wrote maths of total wrote matric	0.414	0.229	187	0.340	0.205	181	0.338	0.230	165	0.295	0.210	1394
% who wrote maths rather than maths literacy	0.463	0.231	186	0.407	0.234	183	0.429	0.262	168	0.371	0.235	1406
Average maths score	45.457	11.720	185	37.383	8.986	177	40.405	10.482	166	37.977	10.342	1372
Average English score (First additional)	55.014	9.515	160	49.978	5.402	174	50.505	8.677	160	49.408	6.605	1348
Average English score (Home Language)	59.811	9.290	56	50.269	6.446	17	54.384	8.763	31	53.080	8.224	151
Independent homelands	0.120	0.325	189	0.110	0.313	180	0.203	0.403	163	0.123	0.329	1423
Self-governing territories	0.196	0.398	189	0.390	0.489	180	0.206	0.406	163	0.373	0.484	1423
DET	0.160	0.368	189	0.300	0.460	180	0.290	0.455	163	0.233	0.423	1423
HOA	0.173	0.379	189	0.073	0.261	180	0.059	0.236	163	0.047	0.211	1423
HOR	0.072	0.259	189	0.047	0.213	180	0.063	0.243	163	0.076	0.265	1423
HOD	0.086	0.281	189	0.014	0.117	180	0.013	0.113	163	0.020	0.139	1423
WCED, TED, CED, FED	0.074	0.263	189	0.005	0.071	180	0.036	0.187	163	0.022	0.148	1423
New	0.110	0.313	189	0.053	0.225	180	0.131	0.339	163	0.105	0.307	1423
INDEP	0.010	0.100	189	0.007	0.085	180	0.000	0.000	163	0.000	0.013	1423
Urban school	0.596	0.492	145	0.375	0.486	147	0.561	0.498	125	0.404	0.491	1167

Data Source: NIDS, Waves 1-4 (2008-2015)

Notes: The table includes all matriculants who are seen within two years of their matric year in the panel; entrance characteristics are taken from the closest year to the individual's matric year for which we have socio-economic data; university includes traditional universities, comprehensive universities, and universities of technology; TVET refers to public Technical and Vocational Education and Training College; the 'other' category includes private colleges and TVETs; post stratification weights for the individual's baseline wave have been used.

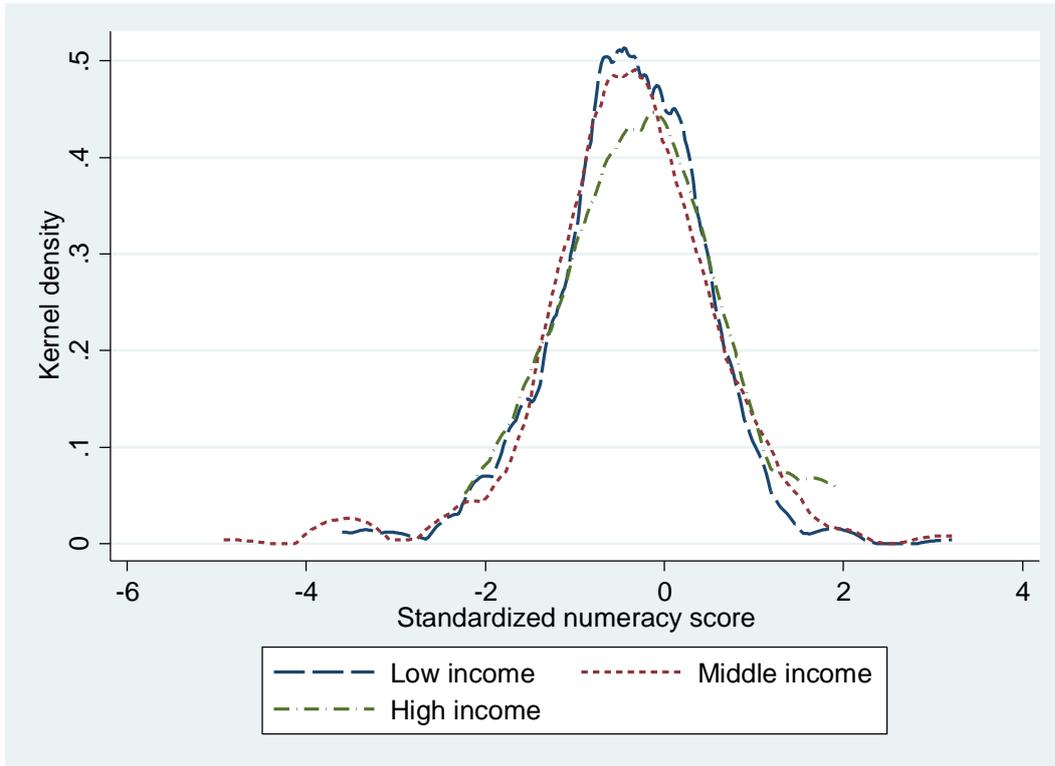
Table 6: Cost and funding by institution type

	University (N=226)			Public TVET (N=215)			Other (N=208)		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
Cost (in Rands)									
Tuition fees	17678.29	16987.96	114	7462.86	19419.27	88	12343.49	17860.13	104
Total educational expenditure	35497.66	82787.83	91	11989.63	22431.53	80	17906.64	21095.50	85
Funding									
Bursary/Scholarship	0.376	0.487	116	0.318	0.468	90	0.139	0.347	97
NGO pays fees	0.019	0.138	115	0.063	0.245	90	0.020	0.140	97
Bursary/scholarships or NGO pays fees	0.388	0.489	116	0.364	0.484	90	0.141	0.350	97
Physical access (in km) in matric:									
Distance to Public TVET or University	11.240	14.720	218	15.723	16.999	203	12.324	14.774	199
Distance to Public University	39.405	44.801	218	51.079	43.174	203	42.290	45.543	199
Distance to Public TVET	12.900	15.511	218	17.053	17.990	203	13.430	15.591	199
Distance to Public UoT	98.763	106.646	218	115.159	97.829	203	119.185	113.521	199

Data Source: NIDS, Waves 1-4.

Notes: The table includes all matriculants who are seen within two years of their matric year in the panel and have enrolled in post-secondary education; physical access in matric is based on the location of their household in the closest year to the individual's matric year for which we have socio-economic data; university includes traditional universities, comprehensive universities, and universities of technology; TVET refers to public Technical and Vocational Education and Training College; the 'other' category includes private colleges and TVETs; post stratification weights for the individual's baseline wave have been used.

Figure 1: Kernel density graph of standardized numeracy score by income tercile

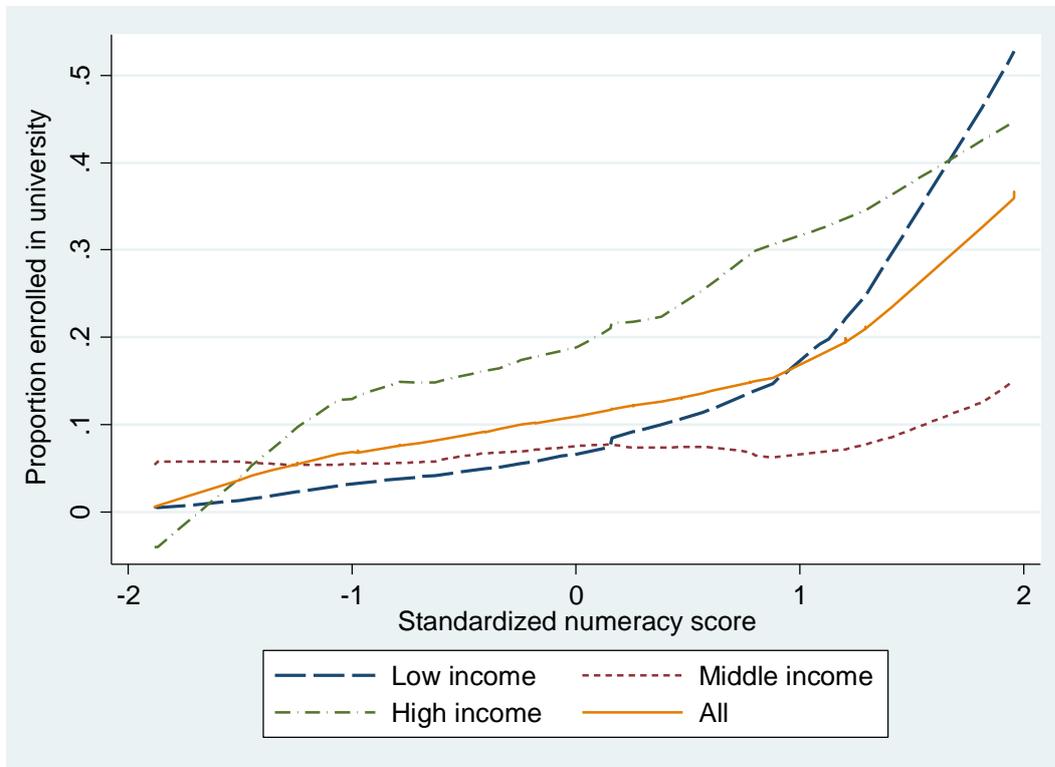


Data Source: NIDS, Waves 1-4.

Notes: Graph includes individuals in our sample who wrote the numeracy test in Wave 1; post stratification weights for the individual's baseline wave have been used.

Figures 2a-c: Proportion enrolling in each post-secondary institution type out of full sample, by standardized score, for each income tercile:

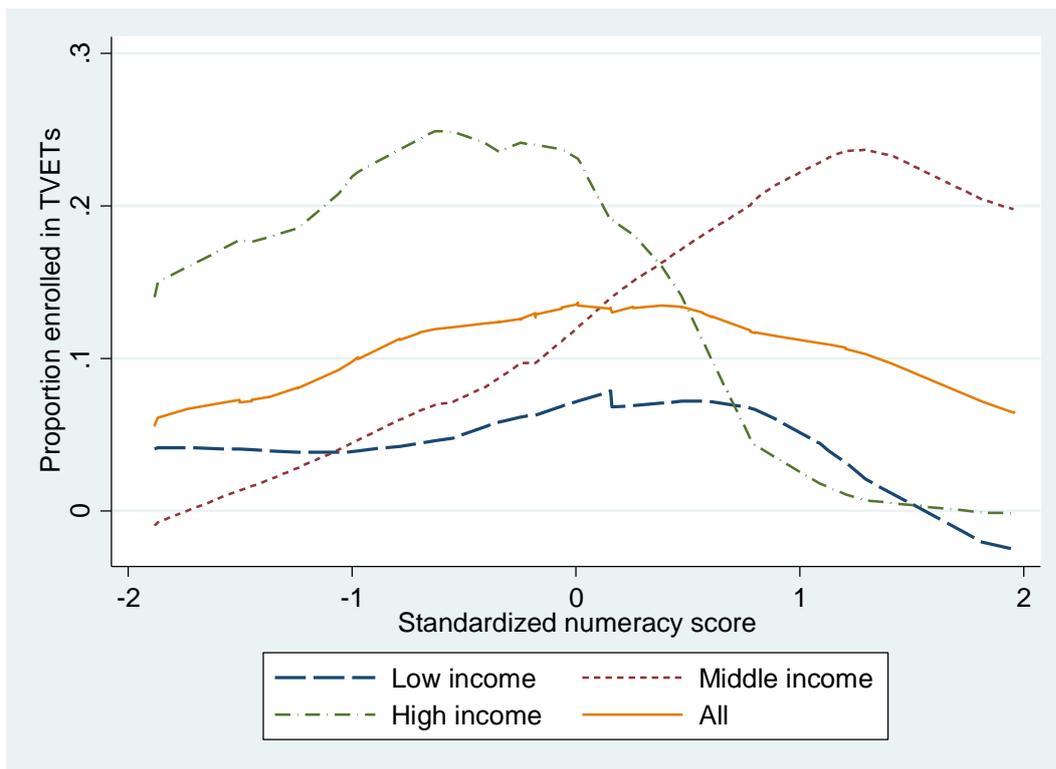
Figure 2a: University enrolment by numeracy test score and income tercile



Data Source: NIDS, Waves 1-4.

Notes: Graph includes individuals in our sample who wrote the numeracy test in Wave 1; individuals with scores more than 2 standard deviations above or below the mean have been excluded; post stratification weights for the individual's baseline wave have been used.

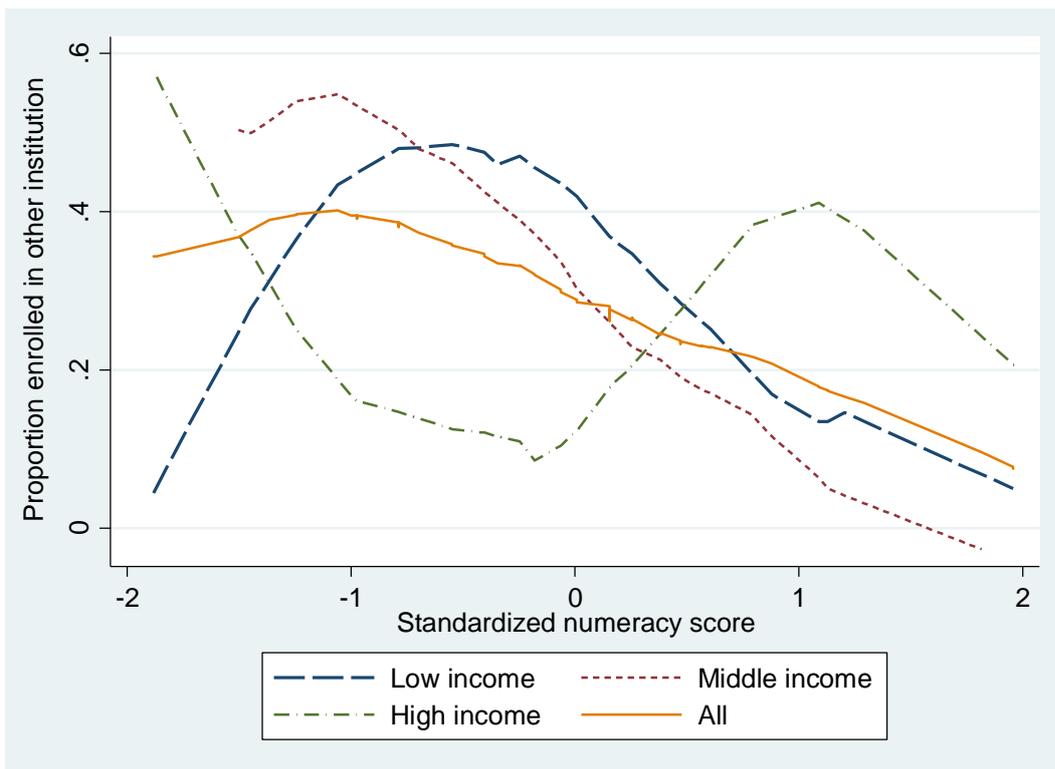
Figure 2b: TVET enrolment by numeracy test score and income tercile



Data Source: NIDS, Waves 1-4.

Notes: Graph includes individuals in our sample who wrote the numeracy test in Wave 1; individuals with scores more than 2 standard deviations above or below the mean have been excluded; post stratification weights for the individual's baseline wave have been used.

Figure 2c: Other institution enrolment by numeracy test score and income tercile



Data Source: NIDS, Waves 1-4.

Notes: Graph includes individuals in our sample who wrote the numeracy test in Wave 1; individuals with scores more than 2 standard deviations above or below the mean have been excluded; post stratification weights for the individual's baseline wave have been used.

Table 8: Multinomial logit regressions of the probability of enrolling by institution type - Including Numeracy Score

VARIABLES	Univariate			TVET			other		
	Uni	TVET	other	Uni	TVET	other	Uni	TVET	other
Numeracy Zscore	0.471*** (0.141)	0.330** (0.142)	0.0150 (0.145)	0.426*** (0.143)	0.330** (0.142)	0.0192 (0.145)	0.457*** (0.144)	0.339** (0.143)	0.0483 (0.146)
Ever repeated	-1.561*** (0.169)	-0.508*** (0.149)	-0.519*** (0.150)	-1.400*** (0.173)	-0.448*** (0.150)	-0.429*** (0.153)	-1.200*** (0.193)	-0.183 (0.172)	-0.262 (0.176)
Log income - mean 0				0.670*** (0.0724)	0.294*** (0.0734)	0.434*** (0.0729)	0.740*** (0.0811)	0.392*** (0.0797)	0.543*** (0.0802)
Controls									
Age, sex, race	No	No	No	No	No	No	Yes	Yes	Yes
Matric school characteristics	No								
Parental education & household size	No								
Distance to PSET in matric	No								
Constant	-1.730*** (0.313)	-1.537*** (0.272)	-2.397*** (0.324)	-1.555*** (0.319)	-1.434*** (0.274)	-2.242*** (0.326)	0.817 (0.788)	0.965 (0.721)	-0.684 (0.747)
Observations	2,265	2,265	2,265	2,264	2,264	2,264	2,264	2,264	2,264
Pseudo R-squared	0.0357	0.0357	0.0357	0.0638	0.0638	0.0638	0.0805	0.0805	0.0805

VARIABLES	Univariate			TVET			other		
	Uni	TVET	other	Uni	TVET	other	Uni	TVET	other
Numeracy Zscore	0.422*** (0.146)	0.336** (0.143)	0.0468 (0.144)	0.392*** (0.146)	0.327** (0.143)	0.0305 (0.143)	0.383*** (0.146)	0.317** (0.143)	0.0177 (0.143)
Ever repeated	-1.143*** (0.196)	-0.192 (0.173)	-0.271 (0.177)	-1.136*** (0.197)	-0.189 (0.174)	-0.250 (0.179)	-1.133*** (0.198)	-0.160 (0.175)	-0.230 (0.180)
Log income - mean 0	0.684*** (0.0836)	0.381*** (0.0825)	0.523*** (0.0826)	0.510*** (0.0918)	0.333*** (0.0890)	0.358*** (0.0897)	0.486*** (0.0924)	0.298*** (0.0900)	0.322*** (0.0908)
Controls									
Age, sex, race	Yes								
Matric school characteristics	Yes								
Parental education & household size	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Distance to PSET in matric	No	No	No	No	No	No	Yes	Yes	Yes
Constant	1.201 (0.805)	0.753 (0.745)	-0.688 (0.762)	0.366 (0.887)	0.0429 (0.803)	-1.844** (0.844)	0.812 (0.916)	0.801 (0.837)	-1.140 (0.867)
Observations	2,264	2,264	2,264	2,264	2,264	2,264	2,264	2,264	2,264
Pseudo R-squared	0.0933	0.0933	0.0933	0.106	0.106	0.106	0.112	0.112	0.112

Data Source: NIDS, Waves 1-4.

Notes: Standard errors in brackets; significance levels: *** p<0.01, ** p<0.05, * p<0.1; the regressions include all matriculants who are seen within two years of their matric year in the panel; the base category for the dependent variable in all regressions is the non-enrolled group – therefore, the coefficients indicate the relationship between the explanatory variables and enrolment in a particular institution type, compared to not enrolling in any form of post-secondary education; controls are taken from the closest year to the individual's matric year for which we have socio-economic data; matric school characteristics include: Dummies for ex-department of education of secondary school, and matric pass rate at secondary school; additional controls in all regressions include: missing dummies; highest grade taken maths, a dummy for no test score, and the difference between numeracy test level taken to recommended level; university includes traditional universities, comprehensive universities, and universities of technology; TVET refers to public Technical and Vocational Education and Training College; the 'other' category includes private colleges and TVETs.

Appendix

Appendix Table 1: Returns to education level, South Africa men and women aged 25-59, 2009-2014

Educational level	2009	2010	2011	2012	2013	2014
Grade 10	0.204*** [0.034]	0.152*** [0.037]	0.145*** [0.039]	0.149*** [0.038]	0.183*** [0.039]	0.232*** [0.040]
Grade 11	0.0482 [0.030]	0.0640** [0.032]	0.131*** [0.034]	0.0847*** [0.032]	0.0772** [0.034]	0.0545* [0.033]
Grade 12	0.448*** [0.025]	0.447*** [0.027]	0.412*** [0.028]	0.385*** [0.027]	0.470*** [0.028]	0.399*** [0.027]
Post-matric diploma/certificate	0.759*** [0.027]	0.769*** [0.030]	0.753*** [0.031]	0.752*** [0.032]	0.696*** [0.033]	0.658*** [0.032]
University degree	0.400*** [0.042]	0.392*** [0.047]	0.432*** [0.046]	0.272*** [0.049]	0.404*** [0.049]	0.539*** [0.048]
Observations	12,056	11,550	11,624	11,543	11,683	11,444
R-squared	0.481	0.438	0.431	0.379	0.388	0.367

Data Source: South Africa General Household Survey 2009-2014.

Notes: Post-matric diploma/certificate includes N4/NTC 4, N5/NTC 5, N6/NTC 6, certificate or diploma with Grade 12, Higher Diploma (Technikon/University of Technology), and Post Higher Diploma (Technikon/University of Technology Master's, Doctorate); University degree includes Bachelor's Degree, Bachelor's Degree and post-graduate diploma, Honours Degree, and Higher degree (Master's, Doctorate), from traditional universities, comprehensive universities, and universities of technology; standard errors in brackets; significance levels: *** p<0.01, ** p<0.05, * p<0.1; regressions are restricted to individuals aged 25-59 for each year; regressions also include race, age, age squared, gender, dummies for grades 1-9, and province dummies; the coefficient is the return relative to next lower level – thus, the coefficient on university degree is the extra returns from this level of education relative to a post-matric diploma/certificate; post stratification weights for each year are used.

Appendix Table 2: Educational attainment of 25-29 year-olds by year, South Africa 2009-2014

Educational attainment	2009	2010	2011	2012	2013	2014
Less than grade 9	17%	16%	14%	15%	14%	12%
Grade 9	9%	8%	9%	8%	7%	7%
Grade 10	13%	13%	13%	12%	13%	12%
Grade 11	16%	17%	16%	17%	16%	17%
Grade 12	35%	34%	37%	36%	37%	37%
Post-matric diploma/certificate	8%	9%	8%	9%	8%	10%
University degree	2%	4%	3%	3%	4%	5%
At least grade 12	45%	46%	49%	48%	49%	51%
Beyond grade 12	11%	12%	12%	13%	13%	15%
% of grade 12s going further	23%	27%	24%	26%	26%	29%
% of grade 12s completing university degree	5%	8%	7%	7%	9%	9%
% of grade 12s who do not go further but have an exemption	13%	8%	7%	5%	6%	7%
Observations	7498	7780	7728	7653	7655	7515

Data Source: South Africa General Household Survey 2009-2014.

Notes: Post-matric diploma/certificate includes N4/NTC 4, N5/NTC 5, N6/NTC 6, certificate or diploma with Grade 12, Higher Diploma (Technikon/University of Technology), and Post Higher Diploma (Technikon/University of Technology Masters, Doctoral); University degree includes Bachelor's Degree, Bachelor's Degree and post-graduate diploma, Honours Degree, and Higher degree (Master's, Doctorate), from traditional universities, comprehensive universities, and universities of technology. Post stratification weights for each year are used. Note that NIDS does not distinguish between a matric with or without

exemption, therefore the NIDS equivalent of ‘% of grade 12s who do not go further but have an exemption’ could not be calculated for table 2.

The GHS and NIDS educational attainment data show somewhat different trends, particularly with regard to the proportion of individuals who have obtained a post-matric diploma or certificate. According to the GHS, 8-10% of 25-29 year-olds have completed a post-matric diploma or certificate, while in NIDS this proportion is higher, at 10-19% (using the waves as cross-sections over time), with a lower proportion having completed matric only. This is due to the way the education questions are asked in the two surveys, and hence the construction of the two variables. The GHS variable comes directly from the survey and is collected with one question: “What is the highest level of education that ... has successfully completed?” In addition, only diplomas and certificates that are of six months plus study duration full-time (or equivalent) are counted (GHS, 2009-2014). The NIDS educational attainment variable, on the other hand, has been constructed using two separate questions: 1. the individual’s highest level of schooling, and 2. the individual’s highest level of education completed outside of school (including diplomas, certificates, or degrees) with no specification of duration or whether it is full-time or part-time. If an individual in NIDS has specified that they have attained any post-matric diploma or certificate that requires a matric, this is counted as an additional level of education. Thus, in the GHS, individuals are less likely to report post-matric diploma/certificate qualifications (particularly those with short study duration). The NIDS educational attainment variable, however, includes all of these qualifications as an additional level above matric, regardless of their study length. We therefore see higher proportions of matric only attainment and lower proportions of diplomas/certificates in the GHS compared to NIDS.

This classification difference is also evident in the comparison of the post-matric diploma/certificate coefficient in the returns to education regressions presented in Table 1 (NIDS) and Appendix Table 1 (GHS). The NIDS coefficient is just over half the size of the GHS coefficient. In NIDS, individuals with a post-matric diploma/certificate have wages about 40% higher than matriculants. In the GHS, this differential is about 70%.

Appendix Table 3: Proportion of individuals seen within two years following their matric, by matric year

	Respondents by matric year		Sample -respondents seen within 2 years of matric		Respondents seen 2 years after matric		Respondents seen 1 year after matric	
	#		#	%	#	%	#	%
Matric year:								
2007	258		253	98%	159	63%	94	37%
2008	413		315	76%	315	100%	0	0%
2009	267		249	93%	184	74%	65	26%
2010	373		310	83%	310	100%	0	0%
2011	290		289	100%	213	74%	76	26%
2012	414		286	69%	286	100%	0	0%
2013	421		362	86%	259	72%	103	28%
2014	473		326	69%	0	0%	326	100%
<i>All years:</i>	<i>2909</i>		<i>2390</i>	<i>82%</i>	<i>1726</i>	<i>72%</i>	<i>664</i>	<i>28%</i>
Poorest income group			1173		912	78%	261	22%
Middle income group			837		574	69%	263	31%
Richest income group			380		240	63%	140	37%
<i>All income groups</i>			<i>2390</i>		<i>1726</i>	<i>72%</i>	<i>664</i>	<i>28%</i>

Data Source: NIDS, Waves 1-4.

Notes: Sample is restricted to individuals seen in matric before age 30 and who were interviewed as adults in their base wave; post stratification weights for baseline wave have been used.

Appendix Table 4: Comparison of characteristics between those in the sample and those not in the sample

	Not in sample		In sample	
Age	19.82	455	18.64	2390
Female	0.58	455	0.57	2390
African	0.80	455	0.88	2390
Coloured	0.09	455	0.06	2390
Indian	0.01	455	0.03	2390
White	0.10	455	0.04	2390
Mother's education	9.49	429	7.91	2308
Father's education	8.72	227	7.49	1379
Matric year information:				
Income	3016.00	455	1463.45	2390
School fees	1932.64	241	1183.49	2038
Household size	5.28	455	6.08	2390
Geo Type:				
Urban	0.69	454	0.52	2389
traditional farms	0.30	454	0.45	2389
farms	0.01	454	0.02	2389
Highest grade took maths	10.15	445	9.75	2342
Ever repeated	0.42	440	0.54	2351
Number of repeats by 2008	0.81	175	0.91	1356
# repeats - grades 1-7	0.32	192	0.40	1273
# repeats - grade 8-12	2.20	197	1.54	1272

Data Source: NIDS, Waves 1-4.

Notes: Sample is restricted to individuals seen in matric before age 30 and who were interviewed as adults in their base wave. Post stratification weights for baseline wave have been used.

Appendix Table 5: Income source year relative to year in matric

Difference in years between base year and matric year	Freq.	Percent	Cum.
-5	4	0.17	0.17
-4	15	0.63	0.79
-3	50	2.09	2.89
-2	230	9.62	12.51
-1	696	29.12	41.63
0	905	37.87	79.5
1	490	20.5	100
Total	2,390	100	

Data Source: NIDS, Waves 1-4.

Notes: Sample is restricted to individuals seen in matric before age 30 and who were interviewed as adults in their base wave. Post stratification weights for baseline wave have been used.

Ideally, we would want to use the home background conditions experienced by the individual during their matric year as their baseline socio-economic status. However, this is not always possible, as a household level interview did not always take place during the individual's matric year. Firstly, the survey was not in field in every possible matric year we are including in our analysis. Secondly, there may have been a household non-response in the year the individual was in matric. Thirdly, we are including individuals who were in matric in 2007 (i.e. before the survey began). Lastly, because we are including 'temporary sample members'¹³ in our analysis, the individual may not yet have been in the survey at the time of their matric. Thus, per capita household income data from the household interview conducted in the year closest to the individual's matric year are used, while the first mentioned parental education data available across all waves is used, to construct baseline socio-economic status.

Appendix Table 6: Comparison of mean characteristics of those in the sample with score vs no score

	No Score (1487)	Score (903)	
Age in matric	18.73	18.51	**
Female	0.55	0.60	
African	0.84	0.93	***
Coloured	0.06	0.06	
Indian	0.04	0.00	***
White	0.06	0.01	***
Traditional	0.45	0.47	
Urban	0.53	0.52	
Farm	0.02	0.02	
Household size	5.93	6.30	
Grant income	0.56	0.66	**
Household income	1757.08	1022.69	**
Mother's highest education	8.10	7.63	
Father's highest education	8.09	6.68	**
Ever repeated	0.53	0.56	
Highest grade took maths	9.72	9.80	
School fees	1532.64	666.84	***
No fee school	0.55	0.58	
Total educational expenditure matric	2777.46	1557.08	***

Data Source: NIDS, Waves 1-4.

Notes: The table includes all matriculants who are seen within two years of their matric year in the panel; characteristics are taken from the closest year to the individual's matric year for which we have socio-economic data; post stratification weights for baseline wave have been used.

¹³ NIDS is a panel of individuals rather than households. An individual's household composition may change over time in that they may join another household, or individuals may join their existing household. Any 'new' household member will also be interviewed but they will not be tracked in subsequent waves. These individuals are referred to as 'temporary sample members' or TSMs. We include both CSMs and TSMs in our analysis primarily to increase sample size.

Appendix Table 7: Multinomial Logit 2 - Sample with score

VARIABLES	Uni	TVET	other	Uni	TVET	other	Uni	TVET	other
Numeracy Zscore	0.474*** (0.141)	0.329** (0.142)	-0.000446 (0.146)	0.443*** (0.141)	0.319** (0.142)	8.96e-05 (0.146)	0.462*** (0.144)	0.323** (0.143)	0.0203 (0.148)
Ever repeated	-1.218*** (0.255)	-0.504** (0.241)	-0.719*** (0.259)	-1.156*** (0.258)	-0.453* (0.244)	-0.683*** (0.261)	-0.884*** (0.311)	-0.351 (0.295)	-0.464 (0.318)
Log income - mean 0				0.450*** (0.118)	0.389*** (0.122)	0.303** (0.131)	0.514*** (0.127)	0.449*** (0.129)	0.403*** (0.140)
Controls									
Age, sex, race	No	No	No	No	No	No	Yes	Yes	Yes
Matric school characteristics	No	No	No						
Parental education & household size	No	No	No						
Distance to PSET in matric	No	No	No						
Constant	-1.554*** (0.464)	-1.500*** (0.426)	-2.565*** (0.560)	-1.420*** (0.472)	-1.355*** (0.431)	-2.429*** (0.564)	1.285 (1.541)	0.0732 (1.396)	-0.786 (1.541)
Observations	852	852	852	852	852	852	852	852	852
Pseudo R-squared	0.0421	0.0421	0.0421	0.0574	0.0574	0.0574	0.0708	0.0708	0.0708
VARIABLES	Uni	TVET	other	Uni	TVET	other	Uni	TVET	other
Numeracy Zscore	0.447*** (0.148)	0.310** (0.144)	0.0112 (0.147)	0.416*** (0.149)	0.304** (0.143)	-0.0179 (0.147)	0.404*** (0.149)	0.288** (0.143)	-0.0177 (0.149)
Ever repeated	-0.856*** (0.312)	-0.324 (0.299)	-0.496 (0.326)	-0.915*** (0.315)	-0.337 (0.304)	-0.522 (0.333)	-0.907*** (0.316)	-0.314 (0.306)	-0.408 (0.337)
Log income - mean 0	0.488*** (0.130)	0.418*** (0.131)	0.390*** (0.143)	0.396*** (0.138)	0.410*** (0.142)	0.282* (0.152)	0.363*** (0.140)	0.374*** (0.143)	0.285* (0.154)
Controls									
Age, sex, race	Yes	Yes	Yes						
Matric school characteristics	Yes	Yes	Yes						
Parental education & household size	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Distance to PSET in matric	No	No	No	No	No	No	Yes	Yes	Yes
Constant	1.467 (1.536)	0.0215 (1.431)	-0.835 (1.587)	1.602 (1.658)	-0.454 (1.547)	-1.772 (1.717)	2.207 (1.685)	0.439 (1.583)	-1.105 (1.765)
Observations	852	852	852	852	852	852	852	852	852
Pseudo R-squared	0.0922	0.0922	0.0922	0.111	0.111	0.111	0.124	0.124	0.124

Data Source: NIDS, Waves 1-4.

Notes: Standard errors in brackets; significance levels: *** p<0.01, ** p<0.05, * p<0.1; the regressions include all matriculants who are seen within two years of their matric year in the panel and who wrote the numeracy test in Wave 1; the base category for the dependent variable in all regressions is the non-enrolled group – therefore, the coefficients indicate the relationship between the explanatory variables and enrolment in a particular institution type, compared to not enrolling in any form of post-secondary education; controls are taken from the closest year to the individual's matric year for which we have socio-economic data; matric school characteristics include: Dummies for ex-department of education of secondary school, and matric pass rate at secondary school; additional controls in all regressions include: missing dummies; highest grade taken maths, and the difference between numeracy test level taken to recommended level; university includes traditional universities, comprehensive universities, and universities of technology; TVET refers to public Technical and Vocational Education and Training College; the 'other' category includes private colleges and TVETs.

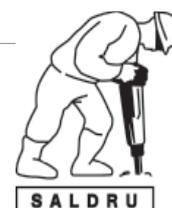
Note on the test score

A large portion of our sample do not have a test score. As mentioned above, some individuals in our sample were not in Wave 1 of the survey and therefore would not have had the opportunity to write the test. In addition, Wave 1 respondents may have refused to write the test. If refusing to write the test is correlated with certain socio-economic characteristics, then the scores will not be missing at random, and this may be biasing our results. Thus, we first compare the mean characteristics for those who do have a score with those who do not have a score. Appendix Table 6 provides a summary of means, p-values, standard deviations, and sample sizes (N). We see that there are some differences: Most notably, learners who had higher levels of school expenditure, household income and father's education are less likely to have a test score. Second, we rerun our six regressions using only the sample who have a test score. The results, provided in Appendix Table 7, show that even within the sample of individuals whose test score is non-missing, the score has a positive and significant impact on enrolment in both university and TVETs and, once again, remains significant even after the addition of demographic, home background, and school level characteristics. Household income also remains positive and significant in explaining enrolment in all institution types.

southern africa labour and development research unit

The Southern Africa Labour and Development Research Unit (SALDRU) conducts research directed at improving the well-being of South Africa's poor. It was established in 1975. Over the next two decades the unit's research played a central role in documenting the human costs of apartheid. Key projects from this period included the Farm Labour Conference (1976), the Economics of Health Care Conference (1978), and the Second Carnegie Enquiry into Poverty and Development in South Africa (1983-86). At the urging of the African National Congress, from 1992-1994 SALDRU and the World Bank coordinated the Project for Statistics on Living Standards and Development (PSLSD). This project provide baseline data for the implementation of post-apartheid socio-economic policies through South Africa's first non-racial national sample survey.

In the post-apartheid period, SALDRU has continued to gather data and conduct research directed at informing and assessing anti-poverty policy. In line with its historical contribution, SALDRU's researchers continue to conduct research detailing changing patterns of well-being in South Africa and assessing the impact of government policy on the poor. Current research work falls into the following research themes: post-apartheid poverty; employment and migration dynamics; family support structures in an era of rapid social change; public works and public infrastructure programmes, financial strategies of the poor; common property resources and the poor. Key survey projects include the Langeberg Integrated Family Survey (1999), the Khayelitsha/Mitchell's Plain Survey (2000), the ongoing Cape Area Panel Study (2001-) and the Financial Diaries Project.



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