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Adolescent econometricians: Perceived earnings differentials and choice for tertiary education

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Abstract

There are acute skills shortages in some sectors of the South African economy. This, coupled with the high levels of unemployment particularly amongst the black African sub population, leads to the expectation that those who pass their matric examinations would go on to enrol at post matric educational institutions. This however does not seem to be the case. This study focuses in particular on the role played by differentials in returns for those with matric education and those with post-matric or tertiary education on the decision to go on to tertiary education.

Heckman's Maximum likelihood method is used to estimate the earnings functions from which differentials in wages are calculated. A multinomial logit model is then used to investigate the destination of youth who have successfully completed their matric exams. At national level, analysis using Labour Force Survey 2005 data points to a higher probability of not enrolling for tertiary education and possibly entering the labour market despite increases in the matric-college earnings differentials. Gender differences are also evident. The probability of men enrolling at a university increases with an increase in the matric–university earnings differential. However, for women, increases in the matric-college earnings differential result in the probability of enrolling at a university increasing, indicating a movement away from the labour market to university education.

The analysis is then extended to Cape Town where controls for socio-economic background and unobserved ability are added to the model. An increase in the earnings differential between those with matric and university qualifications results in a decrease in the probability of enrolling for post-matric education. This could be due to students not being eligible for

university enrolment. On the other hand, an increase in the matric-college differential results in the probability of a matriculant enrolling at a college increasing. Results from similar research are confirmed with the presence of a mother in a young person's household leading to increases in the probability of enrolling for tertiary education. Young people who were not pressurised by parents to search for work are also more likely to enrol for tertiary education.

Key words:

Adolescent econometrician; Matriculant; Earnings differentials

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1 INTRODUCTION

In 2006, South Africa suffered from high unemployment rates of 25.6% and 36% by the narrow and broad definition respectively[1]. Much of the unemployment has neither been voluntary nor frictional. Standing et al (2000) suggested that most of the unemployment in South Africa is structural in nature. Symptomatic of this is the fact that unemployment that appears to be mainly with regard to unskilled workers. According to a report by the Human Science Research Council (2006) on job prospects for matriculants of 2006, only 19% of South African students went for higher education or training after matriculation with 30% being immediately absorbed into the labour market and 51% remaining unemployed. Matric exam pass results have generally been on the increase through the years from 40% in the late 1990's to 66.5%[2] in 2006 yet there seems to be low progression to tertiary education.

South Africa's dilemma seems to be that while it has an oversupply of unskilled workers, there exist some critical skills shortages in various sectors of the economy. There is high demand for skilled labour with some sectors such as health and engineering experiencing acute shortages. According to Bhorat and Leibbrandt (2001: 123), 'Labour demand patterns reflect a growing demand for higher-skilled labour and stagnant or declining demand for less skilled workers'. Bhorat (2004: 955) further concludes that there is a need for upgrading of skills of those individuals entering the labour market each year in search of employment for them to be successful.

[1] According to calculations from the Labour Force Survey March 2006, Statistics SA

[2] N.Taylor, *How Should We Think About the 2006 Matric Results?* JET educational services, February 2007.Available from: http://www.jet.org.za/article.php?a_id=12&PHPSESSID=ff6b6ba925ec73cc3ea9db2c3cd24e6b8 [Accessed 25March 2007]

In light of this, it is puzzling that some youth who pass their matric exams would choose to seek work instead of studying further and acquiring skills demanded by employers. Internationally, many studies have been carried out to try and understand the determinants of choice for higher education (Menon, 1998; Albert, 2000; Cosser and du Toit, 2002; Hung et al, 2000; Sa et al, 2003). This research paper draws on this literature in order to investigate the role of matriculants' expected future earnings in influencing the choice of matriculants[3] in proceeding to tertiary.

The first section reviews literature on unemployment and matriculants in South Africa as well as South African and international studies dealing with demand for higher education. This literature shows that expectations of future income are likely to play some role in decision-making by students after completing their matric and hence a review of literature on returns to education is also undertaken. The second section looks at the general picture of South Africa in terms of the tertiary institutions and financial assistance available for prospective students.

A preliminary analysis of the South African labour market follows. Using Labour Force Survey 2005, March (LFS) data, a discussion on the labour market status and unemployment rates in relation to the highest level of education completed by individuals is done. Returns to education are then estimated and results presented. The differentials in returns are then used in models of whether or not young people on passing matric or grade 12 young completion enrol for either college or university education.

[3] Matriculants in this paper refers only to those who pass their matric examinations, with or without university exemption

This study is then extended to Metropolitan Cape Town in order to allow for the inclusion of additional variables capturing parental influence as well as peer pressure in the model of matriculants' choice for tertiary education. The final section presents conclusions and recommendations.

2 LITERATURE REVIEW

2.1 Matriculants and Unemployment

According to Dias (2005: 1), '… secondary schooling and most importantly the attainment of a matric qualification does not improve the likelihood of procuring employment in South Africa'. However, findings from her study also show that tertiary education seems to significantly improve labour market opportunities for individuals. A number of South African researchers have found results that support this view. Bhorat and Leibbrandt (2001) using 1995 October Household survey data found that people with tertiary education generally had a better chance of getting jobs compared to individuals who had lower levels of education. Oosthuizen (2006: 57) had similar findings, pointing out a rapid increase in unemployment amongst matric certificates holders while 'the value of tertiary education in helping individuals find employment strengthened' between 1995 and 2004.

Obtaining a matric qualification has long been regarded as an important step in order to succeed in the labour market. However this seems to have changed in recent years. Oosthuizen (2006: 40) estimates a 50% increase in unemployment rate among matriculants over a decade running from 1995 to 2004. Other studies have found that only about 36% of

matriculants are able to find employment with only 19% proceeding to further or higher education (McCord and Bhorat 2003; Kraak 2003a, quoted in McGrath and Akoojee, 2005:13). Mlatsheni and Rospabe (2002) also found those with post secondary higher education to have higher chances of employment than those without this education.

Besides the difficulty associated with finding employment for those with only matric qualifications, most of those who are able to get jobs are engaged in low paying unskilled labour. Various studies have been carried out in South Africa to ascertain the returns associated with an additional year of schooling (Moll, 1998; Mwabu and Schultz, 2000; Bhorat and Leibbrandt, 2001; Fryer and Vencatachellum, 2003; Keswell, 2005). These studies will be discussed in the following sub-section. It is important to note for the time being that returns to education were found to increase for those who had obtained matric qualifications and these returns rose sharply again for those with post-matric qualifications. Matriculants who study further and acquire skills therefore can expect to earn much more than they would have had they not acquired those skills.

Given the above findings on unemployment and returns to education, the expectation is that most youth who passed their matriculation examinations would study further. By enrolling for post matric studies they would acquire skills which would not only increase their chances of getting employed but also qualify them for jobs where they would earn higher incomes than if they had no post matric education.

However higher or tertiary education does not necessarily imply acquiring the necessary skills needed by employers. Bhorat (2004) noted with concern the increase in unemployment of

university graduates albeit off a very low base. Upon carrying out a study he attributed this trend to training in skills that were not demanded by industry and commerce.

As Dias (2005: 27) warns, the 'unevenness of employment growth across skills categories' does not allow us to confidently conclude that once the unemployed obtain certain educational qualifications, this will translate into them being employed. She points out that it is not guaranteed that were there to be an increase in jobs requiring certain skills, these would be able to absorb everyone with tertiary education. Dias (2005: 29) is sceptical about 'claims that the educational qualifications of the unemployed need further improvement' basing this on the increase in unemployment rates among graduates. However, this rise in graduate unemployment still accounts for a small proportion of overall unemployment. According to Oosthuizen (2006: 41) tertiary educated individuals are least often unemployed despite an average increase of 4,8% in their unemployment rate between 1995 and 2004. He goes on to note that members of the labour force with tertiary education but were unemployed only represented less than 2,5% of the overall unemployed. Similarly, Pauw, Oosthuizen and van der Westhuisen (2006) found that graduate unemployment was significantly lower than that of other educational cohorts. Caution should therefore be taken not to exaggerate the extent of graduate unemployment in South Africa. What seems to be the case is that the graduate unemployment rate has been growing the fastest of all the education cohorts since 1995 (Pauw et al, 2006). This is a cause for concern and remedial measures need to be taken to address this.

2.2 Local and International Research on Choice for Higher Education

There is a lack of South African literature directed at trying to identify factors that play a major role in the demand for higher education although it has been recognised that enrolment by matriculants is quite low compared to the number of those who are passing their matric. Cosser and du Toit (2002) carried out a study of the period 2001-2002 using a 2001 Grade 12 learners' choice dataset and factor analysis. This study put forward possible reasons influencing intention to enter higher education with 'higher education enhancing employability, intrinsic interest in field of study, higher income, family encouragement to study and offer of a bursary' making up the top five (Cosser and du Toit, 2002: 3). However the extent to which these factors affected decisions was not investigated. This is a gap this paper will attempt to fill, in particular with regard to expected earnings differentials and financial barriers faced by these young people.

In contrast to South Africa, a number of studies have been carried out internationally in an attempt to shed light on decisions to take up employment versus pursuing higher education. Hayden and Carpenter (1990:176) note that generally there have been three ways of investigating the decisions regarding higher education; namely economic, sociological and social psychological. The economic approach views the decision to enter higher education as being influenced by perceptions of the investment yield from higher education. If the benefits of higher education exceed the costs then individuals would be expected to pursue higher education. According to the sociological approach, social origins and variables such as type of school, peer group effects and encouragement from parents were seen as key in determining educational choice. Hayden and Carpenter (1990) focussed on the social psychological

approach, which concentrated more on individual differences in ability and motivational attributes. Their study found transitions from school to higher education in Australia to be a function of individual attributes and situation characteristics. They defined individual characteristics as the academic achievements of the youth as well as other attributes that could motivate them to pursue further studies. Situational characteristics were described as circumstances at home, peer pressure, the school, higher education system, government policies and the labour market. Availability of financial support was also put forward as an important factor in determining the decision to pursue higher education. However, lack of data did not allow for analysis of the effect of financial support. Hayden and Carpenter (1990) found that in the Victorian sample, family background characteristics were insignificant once the regressions controlled for achievement and parental encouragement. In the Queensland sample, achievement, parental encouragement and the value of higher education were the only variables found to be significant.

Albert (2000) carried out her study in Spain, which at the time was experiencing an increase in the demand for higher education while at the same time unemployment was increasing. Using an economic or human capital theoretical framework in which higher or tertiary education would be generally demanded if its benefits exceeded its costs, Albert's model of the demand for higher education included employment expectations as well as family background characteristics as explanatory variables. Data restrictions on income expectations did not allow them to be considered in the analysis. Albert found that family background especially mother's education played a significant role in demand for higher education. Socio-economic

status was also significant. More women than men were found to demand higher education in order to compete with men for jobs[4].

Sa, Florex and Rietveld (2003) carried out an investigation on whether school accessibility played a role in choice behaviour of high school leavers. They found students who lived near institutions of higher education were likely to continue studying after school and to enrol at those institutions close to them. Of relevance to this study is that they were able to separate between choosing university and college education. I adopt this separation in this study too because a preference for university education over college has been observed (Cosser et al, 2004) and there is policy interest in understanding the choice between universities and colleges in South Africa.

Hung, Chung and Ho (2000) incorporated expected income into their model. Their study was carried out in two stages; that is, first estimating the expected returns to education and then incorporating these in a choice model. The Mincerian or short cut method in discrete form was used to derive average rate of returns to higher education *r*, which were estimated by the equation below from Hung et al (2000: 458):

$$r = \frac{E_h - E_s}{n(E_h - C_h)}$$

where:

E_h is annual earnings at start of employment for graduate from higher education

E_s is annual earnings at start of employment for graduate from secondary education

[4] This was due to probable discrimination in the labour market against women which Albert refers to as a screening theory.

n is number of years required to study higher education

C_h is the annual direct cost of higher education

Hung et al (2000) used this method to calculate returns to education as it only required them to have data on earnings at the start of employment after graduation from both secondary and tertiary education. However they cited a drawback with this method in that it focussed on the early period and did not account for earnings over a long period of time making this method inaccurate.

After calculating the expected returns, these were then added as an explanatory variable to the discrete choice model. They found the expected rate of return to higher education, ability and residential status to be significant in influencing the choice to enrol for tertiary education.

Menon (1998) used factor analysis and a discrete choice model to analyse the demand for higher education and found individual factors, economic factors and choice of secondary school subject variables to be significant in influencing choice behaviour of those eligible for tertiary education. In this case, individual factors referred to ability, gender and race. Economic factors followed human capital theory where demand for education would be high if its benefits exceeded its costs (Menon1998: 252).

All in all, these studies put forward a number of different factors that play a significant role in influencing the decision to pursue higher education. Although the importance of factors

differed from country to country, ability[5] turned out to be a significant factor in all the models. The studies also used similar methodology, most using a logistic regression to model choice to higher education. However the study by Hung et al (2000) stands out in that they were able to incorporate returns to education into their study and it is their methodology that is largely followed in this paper. In addition, the distinction made by Sa et al (2003) between university and college is utilised in this study.

2.3 Returns to Education

When students enrol for post-matric education they have certain perceptions or expectations about their future earnings after completion of their studies. Some decisions to pursue higher education could be based on these perceptions.

Most studies carried out in South Africa to estimate the returns to education have used the Mincerian method; that is, by carrying out an ordinary least squares regression (OLS) with log of earnings per hour as the dependent variable and level of education among the explanatory variables. Moll (1998) used splines for primary, secondary and tertiary education to study returns to education for African workers. His results showed that primary and secondary schooling had relatively lower returns of 3% and 10% respectively compared to a rate of return of 60% associated with tertiary education. Primary education was found to be insignificant. Using the same approach, Mwabu and Shultz (2000) had returns of 6.6% for primary, 13.5% for secondary and 26.9% for tertiary with respect to African men and 5.4 for

[5] Menon (1998) measured ability by the student's grade average in the previous school year. Based on their grade, respondents were divided into two categories, namely, high and low ability students. On the other hand Hung et al (2000) used students' examination scores reported in the survey as proxies for their ability.

primary, 21.8% for secondary and 39.4% for tertiary with respect to African women. Both studies were using Mincerian wage regression. However the use of OLS has been criticised for its failure to account for sample selection bias. Sample selection arises from the fact that we can only observe earnings for those who are employed. This implies that by using the Mincerian method we are estimating an earnings function on a sample that has been self-selected and this leads to biased results.

2.3.1 Dealing with selection bias

Heckman (1979) viewed sample selection as a case of omitted variable bias. He proposed a two-step estimation procedure where a model for whether an individual was working or not could be first estimated using a probit regression. The results from this probit regression would then be used to estimate the inverse mills ratio (lambda), which in turn would be added onto the Mincerian wage regression.

Using Heckman's methods requires us to have a selection model which in this case is the employment equation (Verbeek, 2004: 228). The employment and wage equations are given below.

Employment equation $$h^*_i = x'_{2i}\beta_2 + \varepsilon_{2i} \quad (1)$$

Wage equation $$w^*_i = x'_{1i}\beta_1 + \varepsilon_{1i} \quad (2)$$

$$w_i = w^*_i, h_i = 1 \quad \text{if} \quad h^*_i > 0$$

where:

w_i^* represents wages for those who are employed

w_i represents wages that would be earned by those not employed were they to be employed.

w_i is not observed when $h_i = 0$ if $h_i^* \leq 0$

h_i is for whether an individual is working or not

x_i represents the explanatory variables

It is important to have a variable in the participation equation that is not in the earnings or wage function in order to identify both equations in the model (Wooldridge: 2002).

The error terms in equations (1) and (2), that is, $(\varepsilon_{1i}, \varepsilon_{2i})$ are assumed to have a bivariate normal distribution with means of zero and have variances of σ_1^2, σ_2^2 and a covariance of σ_{12}. After normalisation to $\sigma_2^2 = 1$, the distribution of the error terms is given by

$$\begin{pmatrix} \varepsilon_{1i} \\ \varepsilon_{2i} \end{pmatrix} \sim NID\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & 1 \end{pmatrix} \right)$$

If an individual is working then their expected wages conditional on whether or not there are employed will be given by:

$$E\{\ln wage_i \mid h_i = 1\} = x_{1i}'\beta_1 + \sigma_{12}\frac{\phi(x_{2i}'\beta_2)}{\Phi(x_{2i}'\beta_2)} \qquad (3)$$

where the term $\frac{\phi(x_{2i}'\beta_2)}{\Phi(x_{2i}'\beta_2)}$ is the inverse mills ratio or Heckman's lambda (λ).

By estimating equation (3) we do not have omitted variable bias as this is accounted for by the inverse of mills ratio.

Fryer and Vencatachellum (2003: 9) estimated the Mincerian earnings function of women in Machibisa using Heckman's two-step procedure to correct for sample selection. They found

no returns to the 0 to 7 years of education category and positive returns to the first two years of secondary education. Comparing these results to a model where they did not account for sample selection they found that sample selection did not lead to any qualitative differences between the estimates.

However, Heckman (1979: 157) pointed out that even though this two-step procedure gave unbiased and consistent estimates they were inefficient. This inefficiency emanated from heteroscedasticity and the fact that estimates of the inverse mils results are used resulting in loss of precision. A solution to heteroscedasticity would be to use white or robust standard errors. However, Johnson and Dinardo (1997: 449) cautioned that merely adjusting for heteroscedasticity is not adequate. There is still need to deal with the loss of precision from the use of estimates of the inverse mills ratio.

Heckman's maximum likelihood procedure gives more efficient estimates than those from the two-step method (Wooldridge, 2002: 556). Wooldridge however points out that the problem with maximum likelihood estimation is that it relies more on the normality assumption and is thus less robust than the two-step estimator. It is also sometimes difficult to get convergence when using maximum likelihood.

This research will use maximum likelihood. However where it is not computationally possible to get estimates through this method, the two-step procedure with robust standard errors will be used. According to Heckman (1979: 160), the understatement of true standard errors resulting from using estimates of the inverse mills ratio in the two step procedure can be

corrected for by estimation of a the correct variance – covariance matrix to get the correct asymptotic standard errors or robust standard errors, which are used in this study.

Some researchers have expanded on the work by Heckman and have accounted for whether an individual has participated and is employed in the labour market. Bhorat and Leibbrandt (2001) used October Household Survey 1995 data for their study incorporated the probability of finding work in order to identify the key factors selecting participants. Their study was conducted in three steps that is, they first estimated of a probability of labour market participation and then went on to model the probability of those willing to participate in the labour market finding work. Lastly, an earnings function was estimated for those who are able to secure employment. They found that the main variables that determine whether some youth get employed while others tried and did not get employed are age and education. In all the age cohorts the participation equation revealed that older cohorts had a higher probability of participation than youth. The youth were also less likely to be employed compared to older cohorts. On the other hand, while non-tertiary education was found to significantly increase labour market participation, it had a negative effect on employment. This was explained as non-tertiary education being not sufficient to ensure employment. For those already working, they found positive returns to education. This supports previous studies mentioned earlier (Moll, 1998; Mwabu and Schultz, 2000; Fryer and Vencatachellum, 2003).

Bhorat and Leibbrandt (2001: 7) note that the distinction between participation and employment in the selection equation is not important if we are only interested in removing sample selection bias from the earnings equation. For this reason, this study uses the traditional Heckman procedure with an employment equation and a wage regression.

2.3.2 Education and wage differentials.

Betts (1996: 35) noted that economic theory on occupation choice predicts that relative salaries are more important than absolute levels of salaries hence this study uses relative wages in a model of choice to post-matric education. Instead of merely looking at the expected returns to specific levels of education, this study draws from research by Dahl (2002) who used the difference between rates of return of those with a college qualification across regions in influencing individuals' decision to migrate from one region to another. Brosnan and Poot (1987) included differentials in wages to model migration between Australia and New Zealand. By estimating a Mincerian wage function with dummy variables for different levels of education earnings, differentials between other educational levels and matric can be calculated. Le (1998) used a similar approach, using differentials in earning for those who were wage employees and of those who were self employed to investigate their effect on choice of employment status. A probit model for the choice of paid employment was estimated with the wage differential being found to be negative and significant (Le, 1998: 233). However Rees and Shah (1986) found wage differentials for paid employment and self-employment to have a positive effect on self-employment in the United Kingdom.

Le and Millar (1998) criticised these studies for using differentials in current earnings instead of lifetime earnings in modelling employment choices. They however conceded that since lifetime earnings are usually obtained by projecting cross-sectional wage income over the worker's career, cohort effects might make it difficult to have the correct estimates. Also, future earnings would have to be discounted for by some rate and future productivity and wage growth rates some how estimated (Lee and Millar 1998: 416). They argued that future

earnings were important and should be incorporated in estimating wage differentials. This research assumes rather that, for the youth, current earnings are likely to play a more important role in their decision-making. Considering that we make a strong assumption in that they are able to get information on different wages associated with different occupations and educational levels, expecting them to be aware of wage growth rates in the varying occupations would be expecting a lot.

2.3.3 Convexity of earnings

There have been wide debates in South Africa in relation to the convexity of returns to education. This is of particular interest to this study as convexity implies increasing returns to education, which would lead to increased differentials in wage income with more education. Keswell (2004) estimated 'non Mincer' earnings regressions with education and education squared as explanatory variables[6]. Earnings functions with a quadratic polynomial in education were estimated using both ordinary least squares and Tobit regressions and the results showed increasing returns to more levels of education completed and a negative coefficient to the education squared variable. This indicated a turning point at grade 12 after which returns to education were much higher. Therefore, Keswell's research supported the view that returns to education in South Africa were indeed convex.

2.4 Adolescent econometricians

Young people in making their educational decisions are likely to be interested in knowing the financial benefits that result from their choices. It is not logically possible for them to observe their own outcomes before they have made their decisions (Manski 2003: 15). However these

[6] Other explanatory variables in the regression are age, age squared, gender unionisation

young people are able to observe the outcomes, which in this case are earnings, experienced by those who have made their own past schooling decisions. Manski (2003) assumes that all cohorts face the same outcome distribution and hence decisions will be similar across different age groupings. Freeman (1971) makes a similar assumption. Freeman assumed that individuals believed that obtaining a certain level of schooling would result in these individuals earning a similar mean income as an earlier cohort with the same level of education. This study uses the assumptions by Manski (2003) and Freeman (1971) together with the assumption on rational expectations by Willis and Rosen (1979) as quoted in Dominitz and Manski (1997: 856) that 'individuals somehow know the schooling specific income distributions pertaining to his own cohort'. This does not mean that we know the expectations of these individuals but rather that with access to the relevant information we would expect these individuals to generally have similar expectations of their future earnings.

Williams and Gordon (1981: 200) contended that 'an essential step in any model which links private rates of return with the demand for post-compulsory education is that students and potential students are aware of these returns and act upon them.' In their earlier study of the perceived earnings functions in England, they assumed expectations formation as being homogeneous across the youth. In tying returns to education to decisions made by youth on whether or not to continue to tertiary education, this paper assumes that, as adolescent econometricians, the youth are able to 'condition their beliefs on the same variables' and have the ability to understand information in the same way as the other youth (Manski, 2004: 1332). These are strong assumptions to make and are unlikely to hold in the real world. Manski (2004: 1332) acknowledges that these conditioning variables as well as the information processing rule used by the youth were not necessarily the same across studies carried out in

earlier research. A study by Beattle (2002) also cautioned about assuming that all adolescent econometricians are equal, showing that perceptions about their future incomes differed along gender and racial divides. In an effort to address these concerns this study will also be look at the choice of youth in terms of the different gender groupings. The analysis is not extended to population groups due to data limitations. We do not have enough variation in the earnings differentials within population groups for those who have completed matric.

The literature discussed in this section provides valuable insight into the three most important elements of this study. With the adolescent econometricians being able to estimate 'mentally' the differentials in the earning between those with only a matric qualification as the highest level of education they have obtained, and those in possession of college or university qualifications, they then take this into consideration as they make their decisions on proceeding to tertiary education. What is of particular interest in this study is whether these earnings differentials will have any effect on youth's decision to pursue tertiary study after matric and, if so, whether they choose to attend college or university.

3 THE SITUATION IN SOUTH AFRICA

Before proceeding to statistical analysis it is important to understand the South African tertiary education system in terms of its structure and student funding.

3.1 Educational institutions for post matric studies

The South African education system is summarised in Table 1.

Table 1: National Qualifications Framework

Higher Education and Training	Qualification Type
LEVEL 5-8	Post-doctoral research degrees Doctorates Masters degrees Professional Qualifications Honours degrees National first degrees Higher diplomas National diplomas National certificates
Further Education and Training Certificate (FETC)	
NQF LEVEL 2-4	National certificates
General Education and Training Certificate (GETC)	
NQF LEVEL 1	Grade 9 | ABET Level 4 National certificates

Source: http://www.southafrica.info/ess_info/sa_glance/education/education.htm

As can be seen in Table 1 above, education in South Africa is generally categorised into three sections that is general education, further education and higher education[7]. A matric qualification is NQF Level 5, that is, between further education certificates and higher education. Since this study is interested in transitions into tertiary education much of the discussion below will be with regard to the issues to do with tertiary education in South Africa.

Progression into higher education in South Africa depends on students passing their matric examinations. However to be enrolled at university one has to do well in the matric exams

[7] It is helpful to know these classifications in order to create dummy variables that will used to estimate differentials in returns to education. The base category will be grade 12.
General education runs up to grade 9 further education up to 12/ matriculation level

and pass with university exemption. This means that matriculants must pass at least three subjects with a higher grade as opposed to a standard grade. Those who do not pass with university exemption can still proceed to institutions of tertiary education such as universities of technology (formerly technikons) and other further education and training institutions (FETs).

South Africa has 24 state funded tertiary institutions of which 11 are universities; five are technikons or universities of technology and six comprehensive institutions[8]. The universities offer bachelors and postgraduate degrees and are more academically oriented in educating their students compared to technikons. Technikons provide students with a variety of career programmes and offer certificates and diplomas as well as bachelors, master and doctoral degrees. Most Technikons provide their students with a combination of theoretical and practical learning. Universities were divided according to racial groupings by the apartheid government, with those meant for the white population sub-group having a lot of educational resources available while those for non whites did not. Unfortunately the legacy of apartheid has continued to have adverse effects on these previously non-white universities as increased competition among universities in the South Africa (Ishengoma, 2002: 9). This has compromised the quality of education provided by these formally black or historically disadvantaged universities. There have been complaints from industry that graduates, especially those from previously black universities, are not well prepared for the work environment (Pauw et al, 2006: 9). Government, in an effort to spread resources to

[8] Education in South Africa [online], Available from: http://www.southafrica.info/ess_info/sa_glance/education/education.htm [Accessed 14 April 2007]

disadvantaged institutions, merged some of these with those with better resources in 2004. However the effect of this intervention remains to be seen.

Further Education and Training institutions comprise technical colleges, community colleges and private colleges. There are basically three types of FETs in South Africa and these are the general academics, the vocational and the industrial based FETs (Akoojee and McGrath, 2005). Academic FETs provide students with qualifications that could enable them to enrol into universities. Those who did not pass matric with university exemption but wished to proceed to university education could do so through getting the necessary qualifications from these FETs. Some FETs also provide post-matric certificate and diploma courses for students. For this reason FETs are included in the choice for tertiary models later on as possible destinations for students post-matric. According to Akoojee et al (2005) 'vocational and industry-based FETs are more practically oriented'.

South Africa also has a number of private colleges providing training to students and these are registered with the department of education as institutions of higher education. Included in this category are international universities such as Monash[9]. Other institutions include private colleges such as Damelin. Added to this is the presence of distance education learning probably dominated by the University of South Africa (UNISA). Damelin and Intec also offer some courses that can be done through distance learning.

Despite the wealth of skills that could be obtained from FETs and other colleges, in South Africa tertiary education has been largely skewed towards university education. This could be

[9] An Australian university with a branch in Johannesburg

due to the high premium placed on university qualifications (Moll, 1998; Mwabu and Shultz, 2000) as well the relatively lower rate of unemployment among university graduates compared to matriculants and FET graduates. According to Pauw et al (2006: 25) in 2001 '66.1 % of all tertiary students in South Africa were studying at universities or universities of technology.' 34.9% were enrolled in FETs.[10] It is the main aim of this study to ascertain the extent to which premiums to tertiary education determine educational choice between university and college education. In this study, college includes FETs, private and other colleges offering post-matric education.

3.2 Funding of higher education

The economic status of individuals could play an important role in decisions to pursue tertiary education. The earlier discussion of expected returns focussed more on future economic welfare of matriculants. It could also be important to consider their current welfare. Although some matriculants might be aware of high returns associated with higher education, despite doing well and passing their matric exams, they might be constrained financially from pursuing higher education. It is in light of this that a discussion follows on whether there is enough funding available for matriculants to pursue tertiary education.

Before the transition to democracy the economic welfare of South Africans was heavily skewed favourably towards the minority white population. The Tertiary Education Fund of South Africa (TEFSA) was set up in 1991 to assist those students who were historically disadvantaged but wanted to continue to tertiary education (Steyn and de Villiers, 2005: 25).

[10] This is in contrast to the United Kingdom were 36.6% of all tertiary students were at university and 63.4 in further education colleges.

In 1992 the Minister of Education set up the National Commission in Higher Education, which found TEFSA to be a good platform to disburse government financial aid, and in 1996 TEFSA was assigned to manage the National Student Financial Aid Scheme (NSFAS)[11].

The amount of financial aid that students can get through the NSFAS is determined through a means test that takes into account the income of the household to which the particular student belonged. It is estimated that in 2005 approximately 110,000 poor students were awarded funding by NFSAS worth about R1.3 billion.[12] However the loans provided by NSFAS are meant to cover tuition fees and funding is not provided for students' upkeep and other educational costs they might incur such as buying textbooks and various equipment relevant for the different fields of study. Students from poor households would still find it costly to pursue tertiary education.

There are other sources of funding available to students who would like to pursue tertiary education. Some universities award students funding based on their academic merit. Loans are also available from financial institutions such as First National Bank and Standard Bank to help students with fees and other educational expenses. There are a number of companies that provide bursaries[13] to students from poor families as well as those who have done well in their studies. Bursaries from companies are usually restricted to students carrying out studies in their fields of interest.

[11] An act of parliament converted TEFSA into a statutory body called National Student Financial Aid Scheme (NSFAS) in 2000

[12] Available from: http://www.studysa.co.za/contentpage.aspx?pageid=3335[Accessed 3 April 2007]

[13] A list of companies providing bursaries is from University of Fort Hare website. http://www.ufh.ac.za/students/prospective/bursaries.aspx[Accessed 21 September 2007]

Although funding is available for tertiary education, most of it is in the form of loans. This might not be an option poor household would be willing to take, in light of their limited financial resources. They might also not qualify for these loans. This could result in students from these household entering or being pressured to join the labour market and search for employment. Cosser and du Toit (2002) found financial constraint to be one of the main reasons students were not proceeding to higher education. Limited availability of funding for tertiary education provides a challenge to students from poor households.

3.3 Other Options for Matriculants.

Besides enrolling for tertiary education on completion of matric, there are limited options available to matriculants. They can enter the labour market in search of employment. However with youth unemployment being very high, most who decide or are forced to enter the labour market will be unemployed. This is largely because of lack of work experience and skills (Mlatsheni and Rospabe, 2002: 19).

The Skills Development Act was adopted in 1998 to facilitate learnership agreements between employers and either their own employees or the unemployed (Ministry of Labour, 2001). A number of Sector Education and Training Authorities (SETAs) were set up to allocate grants towards the cost of learnerships and towards the learner allowance. Currently there are 27[14] SETAs. This meant that some matriculants who could not enrol for tertiary for whatever

[14] "Learnerships Transforming people transforming South Africa[online]. Available from; http://www.labour.gov.za/download/6496/Useful%20Document%20-%20SD%20-%20Learnerships%20pamphlet.pdf. [Accessed 26 September 2007]

reason and were unable to secure employment in the labour market could be able to gain work experience and skills by taking part in learnership programmes.

4 PRELIMINARY ANALYSIS OF SOUTH AFRICA.

As discussed earlier in the paper, South Africa faces twin challenges with regard to shortages of skilled labour and unemployment. Using LFS data for March 2005, the following section looks at the relationship between the highest levels of education completed by individuals, labour market status, unemployment rates as well as earnings. This descriptive picture sets the scene for subsequent empirical modelling.

The Data (LFS)

Statistics South Africa carries out labour force surveys twice a year to capture information on labour market participation, employment and personal circumstances of individuals and households. This section uses data provided by Statistics South Africa from September 2000 to March 2005. A multistage sampling process was used to identify households from which the data set was to be created. Initially, enumeration areas and district councils were established from which 3000 households were drawn. The Labour Force Surveys collected data across all the provinces in the country and obtained information on individuals and their households. Various questions were asked about individuals' employment status and circumstances and these provided very useful data.

The Labour Force Survey data also has a panel component. Statistics South Africa used a rotating panel methodology to collect data over the years, visiting the same dwelling units at

most, five times over time. After a panel was established, a proportion (20% in 2004) of the dwelling units was replaced by new dwelling units. This data can be used for both longitudinal and cross-sectional analysis[15].

Table 2 shows the relationship between labour market status and the highest level of education completed. Survey weights were used in making calculations. As can be seen from the table, as the level of education becomes higher, overall levels of unemployment decrease. While 49.23% males with matric were employed, this jumped to 74.2% for those with college qualifications and 79.06% for those with university or technikon undergraduate qualifications. Although only 39.88% of females with matric were employed, this increased to 69.97% for those with college and to 76.59 for those with undergraduate diploma, certificate or degree.

Obtaining a post-matric qualification generally seems to result in higher levels of employment than those with only matric across genders and all the population groups. This should encourage those who have completed their matric to continue to tertiary education in order to enhance their chances of being getting employed.

Black Africans[16] also seem to benefit from getting post matric qualification with levels of employment increasing from 41.78% for those with only matric to 71.31% for those with college qualifications and 82.04% for university qualifications. On the other hand unemployment levels for blacks decrease from over just over 25% for those with matric to 14.73% for those with college. With the coloureds, there is also a marked improvement in

[15] Statistics South Africa Report for the LFS March 2005 [online] Available from; http://data1st.com.uct.ac.za/mediawiki/index.php/Category:LFS_March_2005[Accessed January 21 2008]
[16] Following Statistics South Africa, this is defined as anyone who considers themselves to be such. The same definition extends to Coloureds, Indians and Whites.

TABLE 2: Percentages of labour market status and highest level of education completed

	No schooling	< Matric	Matric	College	Undergraduate	Post-graduate
OVERALL						
Employed	21.22	27.70	49.23	74.20	79.06	85.61
Unemployed	12.42	13.58	18.45	9.57	3.52	1.05
NEA	66.36	58.73	32.32	16.23	17.42	13.34
Number of observations	**24208**	63885	16385	3328	1598	793
BY GENDER						
MALES						
Employed	23.01	32.73	58.69	79.39	81.08	84.83
Unemployed	13.46	13.39	17.24	7.42	3.24	1.49
NEA	63.54	53.88	24.07	13.19	15.67	13.68
Number of observations	11349	30028	7796	1432	840	425
FEMALES						
Employed	19.52	22.86	39.88	69.97	76.59	86.61
Unemployed	11.44	13.76	19.69	11.32	3.85	0.49
NEA	69.03	63.38	40.43	18.71	19.56	12.9
Number of observations	12859	33850	8569	1906	746	361
BY RACE						
BLACK AFRICANS						
Employed	17.67	25.66	41.78	71.31	82.04	91.11
Unemployed	12.89	14.27	25.30	14.73	6.93	2.47
NEA	69.43	60.07	32.93	13.96	11.02	6.42
Number of observations	20543	52885	9992	1876	568	197
COLOURED						
Employed	37.59	40.56	64.51	84.84	85.11	99.18
Unemployed	13.31	12.90	13.83	4.90	0.16	0.82
NEA	49.09	46.55	21.66	10.26	14.73	0
Number of observations	2911	9328	2241	329	124	19
INDIAN/ASIAN						
Employed	24.63	29.92	57.89	76.34	84.07	89.64
Unemployed	9.91	11.30	11.07	4.04	5.37	5.33
NEA	65.46	58.77	31.04	19.62	10.56	5.03
Number of observations	770	2028	2656	758	563	356
WHITES						
Employed	58.93	37.54	61.03	76.89	75.47	83.48
Unemployed	3.07	3.34	3.39	1.92	1.19	0.13
NEA	38.00	59.13	34.98	21.19	23.35	16.38
Number of observations	241	853	653	73	80	35

Source: Labour Force Survey, March 2005. Own calculations

Notes:

(1) Survey weights used.

(2) NEA-not economically active that is neither employed nor unemployed

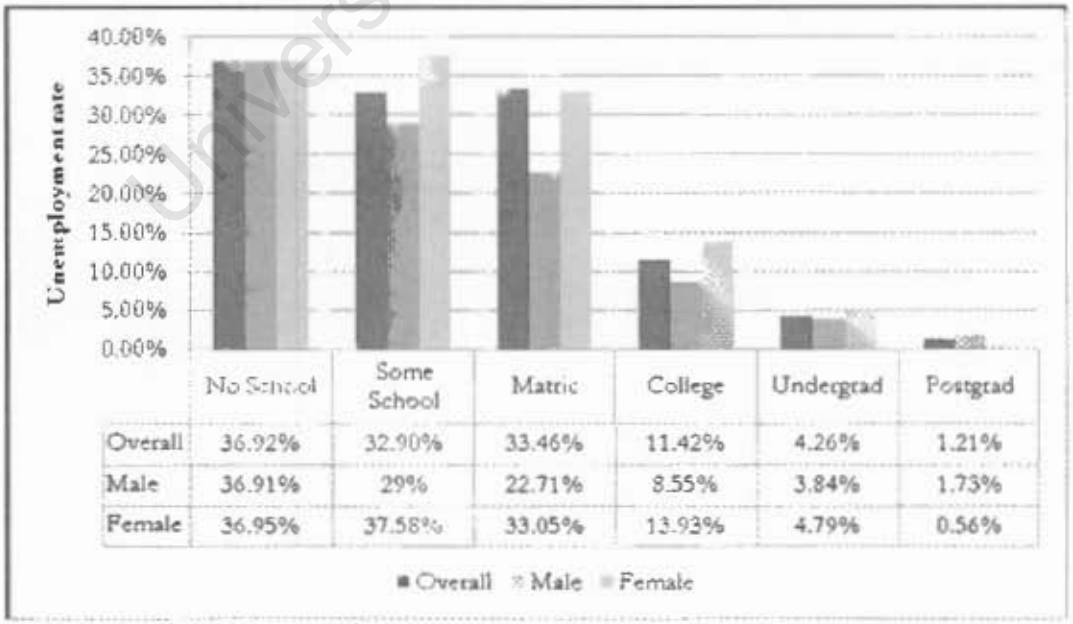
(3) Employed defined as those aged 15-65 and who did any work or who did not work but had a job or business in the 7 days prior to the survey interview.

(4) Unemployed (official) defined as those aged 15-65 who did not have a job or business in the 7 days prior to the survey interview but had looked for work or taken steps to start a business in the 4 weeks prior to the interview and were able to take up work within two weeks of the interview.

levels of employment for those with post-matric qualifications with increases from 64.51% to 84.84% and 85.11% for college and university respectively. Although the levels of employment for the white population do not seem to differ much from the trend followed by black Africans, they should be looked at in the context of the respective unemployment and economically active population. With whites, the level of unemployment is consistently below 4% for those with matric or less and this drops to less than 2% for any post-matric qualification. In the white population sub-group, the majority of those that are not employed are not economically active which is in stark contrast to the black and coloured population groups were the majority of those not employed are classified as unemployment.

Figure 1 gives the unemployment rate corresponding to the different levels of education completed, calculated using LFS 2005 March data.

Figure 1: Unemployment rates, gender and highest level of Education completed



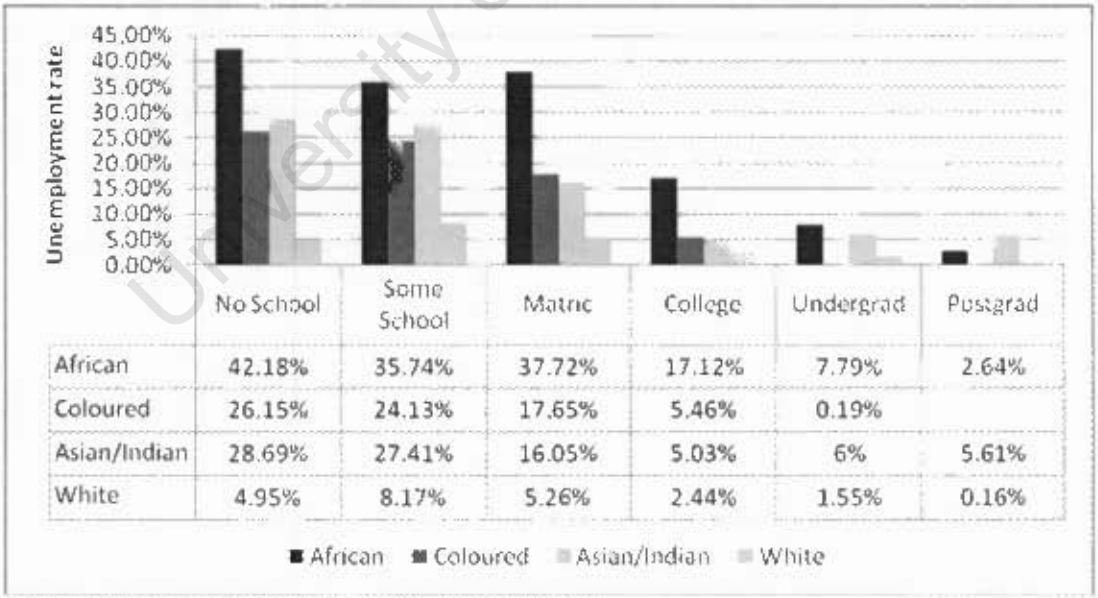
	No School	Some School	Matric	College	Undergrad	Postgrad
Overall	36.92%	32.90%	33.46%	11.42%	4.26%	1.21%
Male	36.91%	29%	22.71%	8.55%	3.84%	1.73%
Female	36.95%	37.58%	33.05%	13.93%	4.79%	0.56%

Source: LFS, March 2005, own calculations.

Unemployment rates[17] for both genders generally decrease the higher the level of schooling completed. However, although unemployment rates are very similar for those with no schooling, as the level of education completed increased the unemployment rates of men become lower than those of women with the largest difference being for those who had completed matric. The gap between the genders closed up for those with college and university qualifications.

Unemployment rates in South Africa also differ for the different population groups. Figure 2 below shows the unemployment rates and highest level of education completed by population group.

Figure 2: Unemployment rate, population group and highest level of education completed



	No School	Some School	Matric	College	Undergrad	Postgrad
African	42.18%	35.74%	37.72%	17.12%	7.79%	2.64%
Coloured	26.15%	24.13%	17.65%	5.46%	0.19%	
Asian/Indian	28.69%	27.41%	16.05%	5.03%	6%	5.61%
White	4.95%	8.17%	5.26%	2.44%	1.55%	0.16%

Source Labour Force Survey, March 2005, own calculations.

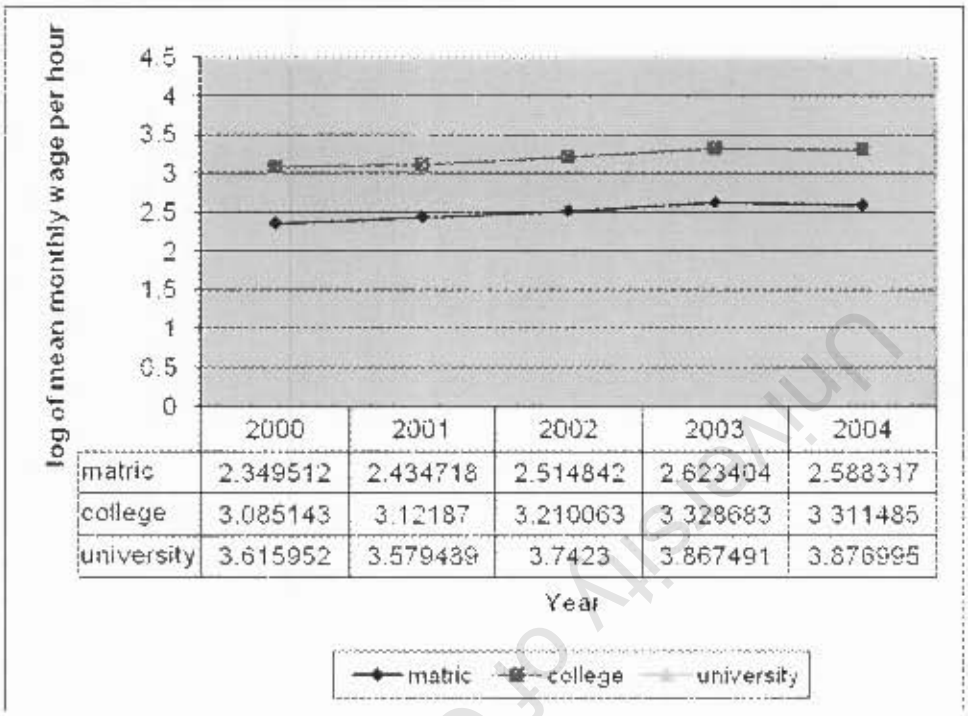
[17] Unemployment rate defined according to Statistics South Africa as unemployed (official definition)/total economically active (employed + unemployed (official definition) *100

From Figure 2, the unemployment rates for blacks and coloureds generally decrease the higher the level of schooling completed. While black Africans with no schooling have unemployment rates of 42.18%, this reduces for those with college to 17.12% and 7.791% for those with undergraduate qualifications. There is however an increase from no schooling to those with matric among the black Africans and this could be as a result of more people who are unemployed but with matric searching for jobs. The unemployment rate of blacks with undergraduate qualifications is also high compared to the other population groups. Some researchers have attributed this to training in disciplines that are not required by employers (Bhorat, 2004; Pauw et al, 2006).

Unemployment rates for whites are generally lower than for blacks and coloureds. The slight increase for those with no education could also be argued to be as a result of those with some education becoming economically active and searching for jobs.

As mentioned earlier, it would be expected that as individuals progressively move from one level of education to the next, we would expect that their earnings would also increase. Figure 3 shows the evolution of average earnings for individuals with matric, college and university qualifications over a five year period from 2000 to 2004, using LFS data. From figure 3 it can be seen that individuals with higher levels of education, on average, have been earning more than those who are less educated. There seems to be an upward trend as the mean of log earnings per hour increases from 2000 to 2004. However the size of differentials in these earnings between those individuals who have completed matric, college and university education does not seem to have changed much with time.

Figure 3: Mean monthly earnings for individuals with matric, college and university: LFS 2000-2004



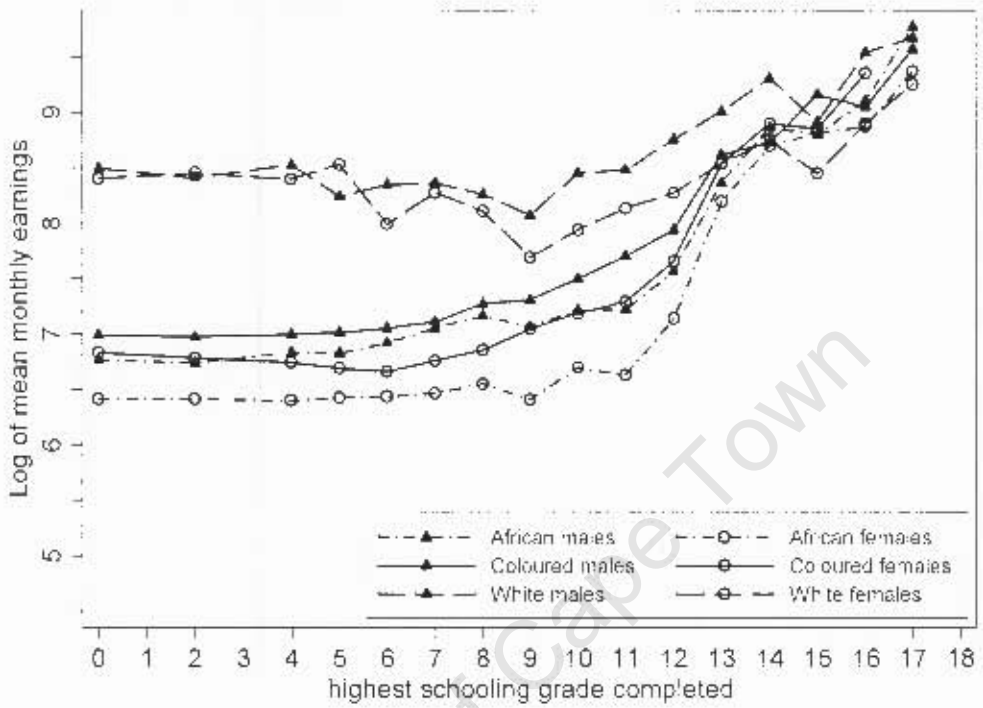
	2000	2001	2002	2003	2004
matric	2.349512	2.434718	2.514842	2.623404	2.588317
college	3.085143	3.12187	3.210063	3.328683	3.311485
university	3.615952	3.579439	3.7423	3.867491	3.876995

Source: Labour Force Survey, September 2000-2004. Own calculations.

Figure 4 shows the log of mean earnings by the highest level of education for the black African, coloured and white population groups. These population groups are further sub-divided by gender.

There is an increase in log of mean monthly hourly earnings with increase in the highest grade of schooling completed for both African males and females. Of interest is the increase as one moves from grade 11 to 12 and from 12 upwards. Matriculation seems to be related with

Figure 4: Mean monthly earnings and highest schooling grade completed



Source: Labour force Survey, March 2005, own calculations.

substantial increases in earnings. Completing a level of education higher than matric leads to a sharp increase in the log of mean monthly hourly earnings. For the coloured population the trend is generally similar to that of the black Africans. The log of mean hourly wages for men are higher than those for women at levels lower than 13, above which there seems to be no particular dominance. Black Africans have the lowest earnings per month compared to the other population groups.

Although the white population group shows an increase from grade 11 to 12 to 13, this increase is not much. This seems to reflect that incomes do not change much with the highest level of schooling completed for whites. The log of mean income for both white males and females is more than that of black Africans and coloureds.

5 ESTIMATING RETURNS TO EDUCATION.

Labour Force Survey 2004, September data was used to estimate the returns to education. These returns were estimated only for those employed in the formal sector. Those in the informal sector and those who are self-employed are not included. This is primarily due to a data constraint in that it is hard to derive a comparable measure of earnings from the net profit figure that the questionnaire gives for informal employment. Matriculants are also more likely to aspire to have careers in the formal sector. Young people who have just completed schooling are unlikely to have financial or material resources to establish informal business, which works against them entering this sector. In light of this, those engaged in elementary occupations and working as domestic workers or in private households are not included in the estimation of returns.

As those currently enrolled for tertiary education were not asked what they expected their future incomes to be, a key assumption in this study is that there is perfect information and students are aware of wages prevailing in the market for the different levels of education.

The percentage difference in returns to education between matriculants and those with college or university qualifications are calculated from the education dummy variables in Appendix B[18]. College in the following models refers to FETs, private colleges and other higher education institutions, which are neither universities nor technikons. The calculated

[18] The differential is calculated by the formula (exp(beta))-1. We multiply by 100 to get the percentage difference between returns from matric and the other levels of education represented as dummy variables.

differentials are used in the choice for tertiary models. The earnings function is estimated using the Heckman's maximum likelihood method.

For this study we are primarily interested in the returns associated with matriculation as well as tertiary education that is college and as university education. Returns to tertiary education represent what matriculants would expect to earn on average across the various occupations and industries available if they pursued tertiary education.

Other explanatory variables used in the estimation include experience, gender, population group, unionisation, occupation, industry and urbanisation. It is difficult to measure and quantify experience. In South Africa the most widely used proxy is (age–school-7). It is important to note that this measure does not take into account that there might be some time or period of time that people will spend unemployed. Also, it does not take into account high grade repetition before matriculation.

5.1 RESULTS

Table 3 shows the differential in earnings between those with matric education and those with other specified levels of education. These are based on the full set of results included in Appendix B. Heckman's maximum likelihood is used to deal with any possible sample selection bias. The reference category for education dummy variables is matric for both Heckman's models and the result given in Table 3.

Table 3: Percentage differences in wages for those with matric from those other levels of education

	Black		Coloured		Indian		White	
	Male	Female	Male	Female	Male	Female	Male	Female
No school	-47.05***	-47.39***	-35.25***	16.89	-57.85	-37.65	-58.56	
some school	43.79***	-30.23***	-29.21***	5.18	-25.27***	-33.19**	-12.80*	0.40
College	37.99***	43.95***	9.44	19.10*	49.33***	56.31**	27.34***	-0.58
University	74.26***	68.93***	75.49**	74.70***	104.28***	345.67***	67.48***	18.70*
Observations	4625	2523	1032	753	263	182	975	836

Source: Labour Force Survey, September 2004,own calculations

Note:
(1) Estimation for Coloured males by Heckman's two-step procedure.
(2) All other estimations by maximum likelihood.
(3) Reference category for the education dummy variables.
(4) Wage regression controls for experience, unionisation, occupation and industry and provincial differences.
(5) Participation regression (working or not) controls for education, age and provincial differences. Household size is the exclusion restriction

From Table 3, black men with college education are earning 38% more than those with only matric. The differential becomes larger when university education is considered, with those with university qualifications earning 74% more than matriculants. The same trend applies to black women. However, the wage differential between matriculants and college graduates is bigger for women (44% compared to 38%) but the differential between those who have completed matric and those who have university qualifications is lower for black women.

For the coloured sub-population, women with college education on average earn 20% more than those with only matric. There was no significant difference in earnings between men with matric and college education. The differentials between both coloured men and women with university qualifications and those with matric were slightly higher than for black men and black women respectively. The Asian or Indian sub-population had big differentials between those with matric and those with any form of post-matric qualification. Women in this group had the biggest differentials.

The earnings differentials for white man, though slightly lower, are very similar to those of blacks and coloureds. However, this is not to say that earnings for these white males are the same with the other groups. The mean log wage rate for both black and coloured men is much lower than those of white men (see Appendix A1). This means that even though the differences might be similar, white men are still earning more in the labour market compared to black and coloureds for the different level of educational qualifications. Women also follow a similar pattern. Wage differentials between matric and university for white women are lower than those of coloured of black women. The log of mean wage per hour is also higher for white women compared to blacks or coloured. It is however difficult to conclude that white women with university education necessarily earn more than black or coloured women as the differences in the wage differentials could be due to black or coloured women with matric earning a lot less than women in the same population group with university or college education.

The estimation of earnings function is not without problems. A brief discussion follows on some of issues that have been concern to researchers.

5.2 Potential Biases

Ability

The problem with incorporating ability into any model is primarily the fact that it cannot be observed and hence cannot be measured. Proxies have to be used such as IQ tests and proficiency such as reading and mathematical examination but even these are subjective. Though there are not entirely accurate there do provide useful information that we can use to

control for ability. Ability could play a role in determining an individuals earnings as well as their choice to whether or not to enrol for tertiary education.

Woodridge (2002: 63) shows that in cases where we are estimating the returns to education and ability is not included in the model then there is a possibility of overestimating returns to schooling. If ability were uncorrelated with the other explanatory variables once the dummies for education have been partialed out, then we would expect to have consistent estimates of the coefficients in the model. The returns to education are likely to be overestimated. Other studies have used instrumental variables such as parental education in the estimation of returns (Card, 1995) basing this on the possible correlation between genetic factors and ability.

Other factors.

Keswell and Poswell (2004) mentioned that the omission of some family background variables could possibly result in biased estimates. Children from wealthier families are likely to have parents who are 'socially well connected' and are thus able to use these networks to secure high paying jobs for their children. Quality and quantity of education could also affect estimates of returns to education. According to Keswell (2004: 847) '…using other indicators of school quality however, such as teacher qualification and teacher-pupil ratios, suggests significant biases in estimated rates of return.'

As a final note Keswell and Poswell (2004: 848) conceded that little is known about the effect of these potential biases on the returns to education in South Africa. This is due to the lack of reliable data. They draw comparisons with 'emerging consensuses' in richer countries and

expect that the net effect of these biases on returns to education in South Africa would be small and that at the very least the convexity of returns to education holds.

6 CHOICE FOR TERTIARY EDUCATION.

The central purpose of the study is to understand the choices made by those able to pass their matric exams in deciding whether or not to pursue tertiary education. The dependent variable captures learner choice after passing matric.

This study uses multinomial logit regression models to study choices made by young adults in choosing between pursuing further education after matric and possibly seeking employment. The error terms in these models have logistic distributions. Other studies (M.E. Menon, 1998: Hung F. et al, 2000: Albert, C 2000) have used the logistic model to study choices between working and pursuing higher education. This study follows Sa et al (2003) in using the multinomial logit model in an attempt to distinguish between university and college education that make up tertiary education. College education in this instance includes both FETs and private institutions. The distinction between university and college is made because a preference for university education is evident in South Africa (Cosser et al, 2004) and university enrolment is particularly dependent on passing matric with university exemption.

Multinomial logit models are used in situations in which there is no natural ordering of alternatives. Verbeek (2004: 208) explains that given we have choices between m alternatives indexed by $j = 1, 2....m$ and that the utility levels that individual i attaches to each outcome/alternative is U_{ij} then individuals will choose the alternative which maximises their

utility, that is, $U_{ij} = \max\{U_{i1},...U_{im}\}$. However these utility levels are not observed. Therefore assuming that $U_{ij} = \mu_{ij} + \varepsilon_{ij}$ where μ_{ij} is a non-stochastic function of observations and a small number of unknown parameters and ε_{ij} is the unobservable error term then:

$$\begin{aligned} P\{y_i = j\} &= P\{U_{ij} = \max\{U_{i1},...,U_{im}\}\} \\ &= P\{\mu_{ij} + \varepsilon_{ij} > \max_{k=1,...m,k\neq j}\{\mu_{ij} + \varepsilon_{ij}\}\} \end{aligned} \quad (3)$$

Assuming that all ε_{ij} are mutually independent with a log Wiebull distribution, the distribution function of each ε_{ij} will be given by

$$F(t) = e^{-e^{-t}} \quad (4)$$

We then normalise so that the model is identified. Normalizing to $\mu_{i1} = 0$ and assuming μ_{ij} to be a linear function of observable variables, $\mu_{ij} = x'_{ij}\beta$, the response probabilities to changes in x_{ij} for alternatives $j = 2,3....m$ are given by

$$P(y_i = j) = \frac{e^{x'_{ij}\beta}}{1 + e^{x_{i2}\beta} + e^{x_{i3}\beta}... + e^{x_{im}\beta}} \quad (5)$$

Response probabilities must sum to unity hence the response probability when j=1 is given by

$$\begin{aligned} P(y_i = 1) &= \frac{e^{x'_{i1}\beta}}{1 + e^{x_{i2}\beta} + e^{x_{i3}\beta}... + e^{x_{im}\beta}} \\ &= \frac{1}{1 + e^{x_{i2}\beta} + e^{x_{i3}\beta}... + e^{x_{im}\beta}} \end{aligned} \quad (6)$$

In estimating multinomial logit models we are interested in how the explanatory variables being considered in the model affect response probabilities of the different alternatives relative to the baseline alternative.

6.1 Limitations

Independence of irrelevant alternatives (IL-1)

The main limitation of the use of a multinomial logit model is it's reliance on the assumption of the independence of irrelevant alternatives (IIA). Given a number of alternatives for which a model is constructed using a multinomial logit model, if we add other alternatives to the model then all the other probabilities for the prior alternatives will change proportionately. However, aside from this rescaling, the multinomial logit imposes the condition that there is no correlation of errors terms, ε_{ij} (Verbeek, 2004: 209). This implies that the utility comparisons of any two alternatives are independent from the addition of a third alternative. From the response probabilities given by equations (5) and (6), the odds ratio for alternative j=1 and j=2 is expressed as $\frac{P(y_i = 2)}{P(y_i = 1)} = e^{x'_{i2}\beta}$. We would not expect any other alternative to have an effect on the odds ratio. In this sense other alternatives are irrelevant. Adding another alternative leaves the odds ratio unchanged. This is rather questionable in some instances as we are assuming that an additional alternative would draw the same number of observations from the preceding alternatives.

Hausman and McFadden developed a test for independence of irrelevant alternatives which estimates a logit model twice, once on the full set of alternatives and other on restricted or a specified subset of the alternatives (Hausman and McFadden, 1984). They concluded that if the estimates from the two logit models were not statistically different, then there is no independence of independent alternatives. On the other hand, Small and Hsiao developed a

test based on a likelihood ratio test. Their test compares the value obtained from the log likelihood equation from the restricted estimation to that of the restricted after substituting with values from the full model. Small and Hsiao were able to remove any asymptotic bias associated with these likelihood ratio tests. For a more detailed discussion of these tests, see Cheng and Long (2007: 589).

Freese and Long (2006:243) warn that in some instances Hausman-McFadden (HM) and Small-Hsiao (SH) tests provide conflicting information on whether IIA has been violated. HM tests were found to have poor size properties even with sample sizes of more than 1000 while the SH test had reasonable size structures for some data structures with sample sizes of more than 500. However with other data structures the SH test did not far any better with increases in sample size. Despite these weaknesses it could be worthwhile to carry out these tests as there would provide useful information especially when there are in agreement. Where the assumption of independence of irrelevant alternatives is rejected, it is inappropriate to use a multinomial logit model.

The data

Labour Force Survey, March 2005 data is used for this part of the research. Although it is not possible to estimate a choice model with some of the variables mentioned in the literature such as mothers education, parental encouragement, cost of tertiary education, teacher-pupil ratios, as information on them was not collected in the Labour Force Surveys, information on household monthly earnings and returns to education can be still be used to get an idea of how financial incentives and barriers influence decisions. The Capes Area Panel Study

collected information on parents' education as well intentions of friends. These variables will be added when the model is extended to Cape Town.

6.2 The sample

The sample used in the estimation of choice for tertiary education consisted of those who had completed their matric. This study is particularly interested in the decisions made by the youth on whether or not to proceed to post-matric education and an upper limit of age 26 was used. This is because high amounts of repetitions prior to completing matric pushed the average age of those currently enrolled at tertiary institutions to range between 22 and 26 years of age. According to Table A2 in Appendix A, a sample size of 3536 young adults was used to estimate the choice model. Of these 1903 were female and 1633 male.

6.3 The Variables

Dependent variable

The dependent variable captured whether a young person on completion of matric, decided to enrol for postmatric education at a university or college, or not to enrol. While the data on current enrolment is available in the LFS data set, those not enrolled in the dependent variable were isolated by looking at those young adults in the sample who had completed their matric by 2005, were not currently enrolled for tertiary and were working. Those not working are excluded to try and reduce the bias resulting from the 'highest level of education completed' data in the LFS as some students who had failed matric might have considered themselves to have completed matric. It is assumed in constructing this variable that those who passed

matric are more likely to be either enrolled at tertiary institutions or working compared to those that did not pass. A more accurate variable can be derived using CAPS wave 3 data were individuals are followed from one year to the next.

Independent variables

Differentials in returns to education

Two variables capturing the perceived earnings differentials between matric and college or university qualifications are used. Estimates of returns from September 2004 on the year before proceeding to higher or tertiary education are used to model choice in 2005. The choice for tertiary education is estimated on Labour Force Survey 2005, March data. Adolescent econometricians, assuming that students have perfect information or at least a good idea of earnings related to certain educational levels[19], make decisions to pursue tertiary education partly due to what they expect to earn after attaining certain qualifications. These expectations are based on current earnings in the labour market.

Household's economic welfare.

Some studies have found that household income plays a large role in terms of students being able to access tertiary education (Sa, Florax and Rietveld (2003:5). This study uses household monthly earnings per capita as a measure of the financial status of the family. However this does not include all household income as some individuals in households could be receiving additional income for social grants such as old age pension, disability and child grants.

[19] Information on how much certain jobs pay and what qualifications are required to apply is widely available to the public from newspaper advertisements. People can also obtain such information from colleagues, or friends. It does not seem unreasonable to assume that when making decisions about schooling choices the have some idea of the returns involved. At least they can rank them.

Dummy variables are added for whether or not there are people in the household receiving grants to control for this.

The financial status of a household is likely to have an effect on young peoples' decisions on whether or not to go for tertiary education. Some students might come from poor families and would rather take up some form of employment in order to support themselves and their families. It could also be the case that although young people from some poor families are aware of the premiums associated with pursuing post-matric education, they find tertiary education too expensive and cannot afford to enrol for further education.

6.4 The results

Table 4 presents results from a multinomial logistic regression on decisions taken by youth on completion of matric. As odds ratios from multinomial logit models are difficult to interpret, the marginal effects for all the alternatives were computed. These marginal effects are reported in Table 4.

Tests were carried out to see if any of the outcomes not enrolled, enrolled at a college and enrolled at a university could be combined. The results for the tests are presented in Appendix C1. These show that we cannot combine or collapse together any of the outcomes at 5% level of significance. This test is important in dispelling the idea that a tertiary/no tertiary model is more appropriate than a university/college/no tertiary model.

Table 4: Marginal effects: Choice for Tertiary Education: Multinomial logistic regression

	Not enrolled	University	College
Predicted probability	0.7979	0.1247	0.0774
Δ in returns to university	0.01869	-0.01519	-0.0035
	(0.02412)	(0.0181)	(0.0139)
Δ in returns to college	-0.1814**	0.1374*	0.0440
	(0.088)	(0.0745)	(0.0489)
Household grant-1person	-0.0286	0.0309	-0.0023
	(0.03116)	(0.0285)	(0.0178)
Household grant-> 1person	0.0921**	-0.0798***	-0.0123
	(0.03984)	(0.0288)	(0.0313)
Male	-0.0167	0.01243	0.0043
	(0.0188)	(0.01509)	(0.0124)
White	-0.1032**	0.1230***	-0.0199
	(0.04229)	(0.0394)	(0.0186)
Log per capita earnings	-0.0614***	0.0506***	0.0119**
	(0.0088)	(0.0076)	(0.0052)
Observations	2848	409	279
Log-likelihood	-2254.458		
Psuedo R2	0.0849		

Source: Labour Force Survey, March 2005

Notes:

(1) Survey weights used

(2) * Significant at the 10 percent level; ** Significant at the 5 percent level; *** Significant at the 1 percent level, standard errors in parentheses.

(3) Estimations also control for provincial differences.

(4) Δ in returns to university education is a measure of the current matric-university earnings differential

(5) Δ in returns to college education is a measure of the current matric-college earnings differential

The predicted probability for enrolling into a tertiary institution is 20% in the model. This is almost equal to the 19% tertiary enrolments estimated in Cosser and du Toit (2006). The results also show the bias to university education in South Africa with 12% probability predicted for university education and 8% for college.

While current earnings differentials between those with up to matric education and those with university education do not appear to have an effect on choices to enrol for college or university education, earnings differentials between matric and college encourage university

enrolments do. A 1% percent increase in the earnings differential between those with matric and college qualifications would result in the probability of not enrolling for tertiary education decreasing by 18% at 5% level of significance. At the same time the probability of enrolling at university increases by 14%. This could be as a result of earnings for college graduates being so low such that small increases do not encourage college enrolments. It could be the case that matriculants would rather go to university were returns to their education would be higher.

Having more than one person in the household receiving a grant also has a significant effect on the path taken by matriculants. However caution must be taken in interpreting these marginal effects. Firstly, households that do not receive pensions plausibly have enough financial resources. It could also be that there are poor households that do not have anyone eligible to receive a grant. However including a control for whether a student lives in a household receiving a grant helps control for additional household income from social grants. A 1% increase in the log of household earnings per capita results in the probability of not being enrolled for tertiary education decreasing by 6%. The same increase also results in an increase of 5% in the probability of enrolling at a university. It could be that with increase in these earnings, young matriculants will have enough funds to enrol for university education. There is also less pressure from the household for them to work and contribute to the household income.

The probability of white matriculants not enrolling for tertiary education is 10 % less than that of non-whites. By the same token, the probability of whites being enrolled for university is 12% more than that of non-whites.

Estimation of returns to education reflected gender and racial differences in earnings. Taking these differences into account, the choice models were estimated separately for the different genders with the differentials specific to each gender used in the relevant model. The results for the males are shown in Table 5.

Table 5: Choice for Tertiary Education: Marginal effects for Males

	Not enrolled	University	College
Predicted probability	0.791	0.1327	0.0764
Δ in returns to university	0.0467	0.3202*	-0.3669**
	(0.2247)	(0.1775)	(0.1503)
Δ in returns to college	-0.2148	0.1020	0.1128
	(0.1332)	(0.1155)	(0.0750)
Household grant-1person	-0.0231	0.0273	-0.0041
	(0.049)	(0.0456)	(0.0279)
Household grant-> 1 person	0.0703	-0.0836*	0.01333
	(0.0646)	(0.0463)	(0.05686)
White	-0.0865	0.1448**	-0.058***
	(0.0597)	(0.0583)	(0.0212)
Log per capita earnings	-0.0639***	0.0431***	0.021***
	(0.0135)	(0.0120)	(0.0078)
Observations	1316	197	120
Log likelihood	-1062.253		
Psuedo R2	0.0901		

Source: Labour Force Survey, March 2005

Notes:

(1) Survey weights used.

(2) * Significant at the 10 percent level; ** Significant at the 5 percent level; *** Significant at the 1 percent level, and robust standard errors in parentheses

(3) Estimations also control for provincial differences.

(4) Δ in returns to university education is a measure of the current matric-university earnings differential

(5) Δ in returns to college education is a measure of the current matric-college earnings differential

The results for tests of the possibility of combining the outcomes are presented in Appendix C2. These show that we cannot combine the three possible paths that could be taken by matriculants.

The predicted probabilities in Table 5 for men are similar to those of the combined model in Table 4, with a bias towards university education. The results in Table 5 show that matric-university wage differentials are more important in determining the decisions of young males in enrolling for college education. A 1% increase in the earnings differential between those with matric and university qualifications would result in the probability of enrolling for college decreasing by 37% at 5% level of significance. The probability of enrolling at a university increases by that 32% although results are significant at only 10% level. This could be signalling a shift from college education towards university education with increases in this differential.

Again log per capita earnings are likely to reduce the probability of not enrolling for tertiary while at the same time increasing the probability of enrolling for university and college by 4% and 2% respectively. These results are significant at 1% level.

White men are also less likely to be not enrolled or enrolled at a college than non-white. The probability of white men enrolling for university education is 14% more than that of non-white and their probability of enrolling for college education is 6% less.

Tests for independence of irrelevant variables were carried out and the results are reported in Appendix D2. There seems to be contradiction between the Hausman test and the Small-

Hsiao test on whether we should reject or accept the null that there is independence of irrelevant variables. For this male sub-group, the Hausman test accepts the null hypothesis whilst the Small-Hsiao test rejects it. When these test are done for the females, there also appears to be a contradiction. However, according to McFadden (1973) it suffices to use multinomial logit models when alternatives '…are distinct and weighed independently in the eyes of the decision maker'[20]. For this reason, not much significance will be attached to these tests in instances were they contradict each other. The alternatives of not to enrol, enrol at a university and enrol at a college are distinct and the multinomial logit model will be applied to model the choice behaviour of matriculants

As mentioned earlier, estimation of returns to education indicated differences in earnings for the different genders. Marginal effects for females are shown in Table 6.

Predicted probabilities for the individual gender models are similar to each other and those of the combined model in Table 5. The results presented in Table 6 show that earnings differentials between those with matric and college qualifications are more important in determining the decisions of young females in enrolling for university education.

A 1% increase in the earnings differential between those with matric and college qualifications would result in the probability of enrolling at a university increasing by 55% at 1% level of significance. At the same time the probability of not enrolling decreases by 65%. This could be indicating a movement away from labour market to tertiary education. It is surprising that changes in differentials in matric-college earnings differential have no effect on college

[20] As quoted in Long and Freese (2006:243)

Table 6: Choice for Tertiary Education: Marginal effects for Females

	Not enrolled	University	College
Predicted probability	0.806	0.116	0.0774
Δ in returns to university	0.0346	-0.0351**	0.0005
	(0.0236)	(0.0172)	(0.0421)
Δ in returns to college	-0.6490***	0.547***	0.1019
	(0.2131)	(0.1805)	(0.1682)
Household grant-1person	- 0.035*	0.0329	0.0020
	(0.0385)	(0.0343)	(0.0258)
Household grant->1person	0.1031**	-0.0750***	-0.0282
	(0.0408)	(0.0253)	(0.0471)
White	-0.4765***	0.4782***	-0.002
	(0.1478)	(0.1755)	(0.0945)
Log per capita earnings	-0.0590***	0.0527***	-0.0063
	(0.0112)	(0.0094)	(0.0074)
Observations	603	212	159
Log-likelihood	-1160.8667		
Psuedo R2	0.1019		

Source: Labour Force Survey, March 2005

Notes:

(1) Entries are marginal effects and standard errors in parentheses.

(2) * Significant at the 10 percent level; ** Significant at the 5 percent level; *** Significant at the 1 percent level

(3) Estimations also control for provincial differences.

(4) Δ in returns to university education is a measure of the current matric-university earnings differential

(5) Δ in returns to college education is a measure of the current matric-college earnings differential

enrolment but increases probability of enrolling at university. This could be explained in part as the increase in differential being not sufficient enough to encourage college enrolments. However, those employed in the labour market might be discouraged from continuing with work as the wage gap between them and their more educated colleagues increases hence they enrol for university education. Increases in the earnings differential between those with matric and university education seems to lead to 3% decrease in the probability of enrolling for university decreases. Although puzzling at first, considering the small changes in the probability compared to the effect of the matric-college differential, it could be that matric–university differentials might be increasing for some occupations or careers while decreasing or stable for others. Enrolments into fields of study related to occupations where earnings are

perceived not to be increasing at the same pace as other careers might result in prospective students who were interested in that field opting for the labour market. This however needs to be confirmed by research into the choice between the different fields of study, once an appropriate data set is available.

Once again log per capita earnings reduces the probability of not enrolling for tertiary education. At the same time the probability of enrolling for university education increases. These results are significant at 1% level.

White women are more likely to be enrolled for tertiary education. The probability of white women enrolling for university education is 47% more than that of non-white.

Matric-college wage differentials seem to play a different role for the different genders. While these differentials do not appear to be important for men, increases in this differential increase the probability of women enrolling for university education. More research might have to be done to try and understand this trend.

7 FURTHER INSIGHTS: METROPOLITAN CAPE TOWN

A drawback of using Labour Force Survey data is that a lot of the information that other studies have found to have an influence on decisions to study at institutions of higher education is not available. However the Cape Area Panel Survey carried out in the Western Cape (CAPS) can provide a wider understanding of factors not captured by the LFS.

7.1 The CAPS data

The CAPS was mainly carried out on young adults in the Western Cape. The first wave was done in 2002. These young adults were then followed up in subsequent surveys. This type of panel study enables observations to be made on how the behaviour of the young adults in the survey has been changing with time. The surveys were mainly conducted on individual's aged 14 to 22 in wave1.

According to Lam et al (2006), in wave 1, a random sample of 5256 households was chosen by using aerial photographs to identify households to sample in each Enumeration Area. The sampling design produced a young adult sample of 4752. This resulted in large enough samples of young adults from each of the three major population groups, that is, 2144 Africans, 1976 Coloured and 593 White. There was over-sampling of Africans and Whites in an effort to have large enough samples to allow researchers to study what was happening within these population groups in Cape Town.

Wave 2 was conducted in two phases. In 2003, wave 2a, only a third of young adults interviewed in wave 1 were re-interviewed with basically the same questions being asked as in the initial wave. The second phase of wave 2 was conducted in 2004. In wave 2b the remainder of the two thirds not interviewed in wave 2a were interviewed. Wave 3 was conducted in 2005 and all the young adult respondents from wave 1 were re-interviewed. In order to use the data to represent the behaviour of young adults in Cape Town, population weights derived from the 2001 census could be used for wave 3.

Comment on the data

A major drawback is that in wave 2b, not all the youth were interviewed. Whereas wave1 and wave 3 conducted full interviews on households, wave 2 was limited to only the young adults in the panel study. This meant that useful household level information was not collected. Of particular relevance to this study, we cannot estimate the returns to education for wave 2 carried out in 2003 and 2004, as earnings data was not collected from other members of the household the young adult belonged to. Young adults in the panel study were being asked about earnings from more than one job. This meant that these earnings were not representative of the returns from education but rather on how many jobs an individual was able to secure. A solution to this is to use the Labour Force Survey September 2004 to estimate earnings differentials but restrict sample used to individuals in the Western Cape Province. However there were not enough observations to estimate returns for the different gender and population groups as done earlier in Table 3. Differentials in returns between those with matric and those with either college or university education for all the metropolitans in South Africa are calculated from LFS September 2004 data and used to model choice behaviour in metropolitan Cape Town.

This study primarily looks at the effect of differentials in returns to education on choices made at the beginning of 2005, hence data from the third wave of CAPS are used. Of those who were doing matric in wave 3 and not intending to study further, when asked why not, 61.22% said they wanted to get jobs and 20.86% said they did not have the money. This reflected the strong influence of both possible financial gain as well as financial barriers in making decisions on whether or not to study. Data on household income from CAPS is inclusive of remittances as well as social grants. This gives more reliable information of

financial status than household earnings used in the earlier models using LFS data. Most of the young adults in wave 3 were aged between 16 and 24 and were still enrolled in school. This meant that there were only 766 young adults who had completed matric and could be used as the estimation sample. This lack of data limited the estimation of model to only the overall population, with gender not being considered. There is not enough variation in differentials in earnings to look at the choices of matriculants from the different population groups separately.

7.2 Choice for Tertiary Education

A multinomial logit model is used to analyse the transition from school to work or tertiary education for Cape Town youth. Additional explanatory variables are included. In the Western Province the population group dynamics are different from that of the rest of South Africa. The coloured population is dominant (50%) and together with the white sub-population group, account for 67% of the total population, according to the 2001 census (Lam et al, 2003). However as mentioned earlier, over sampling of some population groups was done. In the analysis of CAPS data, Survey weights are used to avoid any bias.

A choice behaviour model is estimated with the matriculant having the option of not enrolling for tertiary, enrolling at a university or enrolling at a college. The log of household income per capita is included as one of the explanatory variables as the models using LFS March 2005 data showed the amount of financial resources available at home for the matriculant was likely to influence decisions regarding tertiary education. However, household income in the CAPS data is inclusive of social grants and other remittances the households receives. There is

therefore no need to control for grants as in the earlier models as these have been accounted for. The choice for tertiary education model in Cape Town also includes additional variables and these are discussed below.

Dependent variable

The dependent variable has the three outcomes, currently not enrolled, enrolled at a college and enrolled at a university in 2005. While matriculants current enrolled can be easily identified, those not enrolled were isolated by limiting them to students who had passed matric in 2004 but were not enrolled for either college of university education in 2005.

Additional variables

Mother's education

Albert (2000) found mother's education played a significant role in making choices about pursuing further studies. This could be due to the genetic correlation with the ability of the child. It could also be the case that more educated mothers would encourage their children to study further. This is tested in the model.

Situational characteristics

The presence of parents in the young person's household seems to have an effect on whether they study post matric or not (Hayden and Carpenter, 1990). This could either be in a negative or positive way. Parents could pressure their children to look for work and help support the family instead of studying in poor households. They could also help their children and motivate them to enrol for post matric education.

Peer group effects

Young people are impressionable and the plans and decisions of their friends can easily affect their personal choices. If a young matriculant has friends proceeding to or already enrolled at tertiary education institution, it might influence his or her choice to enrol.

School quality

School quality could also play an important role in decisions of matriculants to pursue further education. Matriculants from schools were the importance of post matric education is stressed and resources are available to help them plan their future might be more likely to enrol for college or university education. Pupil-teacher ratio is used as a proxy for school quality.

Ability

A number of researchers have found ability to play an important role in making decisions to pursue higher education (Sa et al, 2003; Hung et al, 2000). However it is difficult to measure ability. In cases where proxies for ability are found, including these measures in a model using CAPS data could be problematic. This is because measures such as literacy and numeracy test scores are highly correlated with other explanatory variables in the model such as mother's education and having a mother resident in the household. For this reason, this study follows Hansen, Heckman and Muller (2004) by regressing standardised literacy and numeracy test scores on a number of variables such as age, race, languages test taken, parents education, proportion of life lived with parents, whether parents helped with homework, whether they had resources like books or computers, pupil-teacher ratio and former department under which their former school fell in. Results are shown in Appendix E. The residual from this regression presents a measure of ability which is then included in the choice for tertiary

education model. Education is not included as an explanatory variable in the standardized literacy and numeracy test score regression due to its strong correlation with ability. Although these residualized test scores provide a way for controlling for ability in the choice model, caution must be taken in interpreting the coefficient.

The results in Table 7 show that differentials in returns are more important in determining the decisions of youth in Cape Town regarding enrolment for college education than there were at national level. From the table, it can be seen that a 1 % increase in the earnings differential between those with matric and university qualifications results in the probability of enrolling for college and university education decreasing while the probability of not enrolling increases. The constraint of having to pass matric exams with exemption in order to enrol for university education leads to difficulties in the interpretation of this increase. It could be that although the matric-university earnings differential increases, some matriculants are still unable to qualify for university education. This seems to be supported by the increases in college enrolments as the matric-college earnings differential increases. A matric pass is sufficient to enrol at a college.

Increases in the log of household income per capita increase the probability of those who have completed matric enrolling for college education. Matriculants with fathers who have more than matric education have a higher probability of enrolling for college education and having the mother resident in the young adult's household results in a higher probability of enrolling for both university and college education. Pressure from parents to work also results in a higher probability of not enrolling compared to matriculants who are not being pressurised. Having friends already at tertiary also results in the young matriculant having a

Table 7: Marginal effects from a multinomial logit model: Choice to tertiary education in Cape Town.

	Not enrolled	University	College
Predicted probability	0.4773	0.1771	0.3456
Δ in returns to university	1.3965***	-0.6086**	-0.7879**
	(0.4463)	(0.2517)	(0.3921)
Δ in returns to college	-0.5803**	0.0131	0.5672**
	(0.2325)	(0.1621)	(0.2449)
Log per capita income	-0.0875*	-0.0757***	0.1633***
	(0.0449)	(0.0242)	(0.0494)
White	0.2673	-0.0998	-0.1676
	(0.1800)	(0.1030)	(0.1447)
Male	-0.2347***	0.2237***	0.0109
	(0.0757)	(0.0598)	(0.0840)
Father's education<matric	0.0104	-0.0310	0.0207
	(0.0949)	(0.0601)	(0.0940)
Father's education>matric	-0.1430	-0.1093*	0.2546**
	(0.1233)	(0.0581)	(0.1136)
Mother's education<matric	0.1725*	-0.0947	-0.0777
	(0.1005)	(0.0800)	(0.0977)
Mother's education>matric	-0.0880	-0.0242	0.1122
	(0.1393)	(0.0739)	(0.1214)
Mother resident	-0.2798***	0.7217*	0.2076***
	(0.0791)	(0.0430)	(0.0692)
Pressure from parents	0.4130***	-0.0352	-0.3778***
	(0.0623)	(0.0449)	(0.0602)
Friends at tertiary	-0.1971***	-0.0024	0.1995**
	(0.1040)	(0.0679)	(0.1013)
Pupil teacher ratio	-0.0223	0.0112	0.0110
	(0.0224)	(0.0161)	(0.0214)
Pupil teacher ratio missing	-0.2109	0.1166	0.0943
	(0.6897)	(0.2428)	(0.6202)
Ability	-0.1159**	-0.0923**	0.2082***
	(0.0530)	(0.0395)	(0.0540)
Observations	221	159	82

Note
(1) Robust standard errors in parentheses.
(2) * Significant at the 10 percent level; ** Significant at the 5 percent level; *** Significant at the 1 percent level.
(3) Survey weights used in estimations.

higher probability of enrolling for at a university than those with no friends already enrolled.

All in all, perceived earnings differentials seem to have different effects on decisions of Cape Town youth to pursue tertiary education compared to South African youth as a whole. While at national level, matric-university differentials do not appear to play a significant role on decisions taken by matriculants, an increase in this differential in Cape Town results in increases in the probability of matriculants not enrolling for either college or university education. This could be as a result of matriculants not qualifying for tertiary education, particularly university. Increases in the matric-college earnings differential increase the probability of matriculants enrolling for college education. Analysis of national level data for men revealed that an increase in the matric-university differential decreases the probability of enrolling at a college, as with Cape Town sample. However, whereas the matriculants in Cape Town also had increases in the probability of not enrolling for tertiary with increases in the matric-university differential, male matriculants at national level had a higher probability of enrolling for university. Further research might be needed to fully understand these different reactions to changes in the earnings differentials.

7.3 Concerns

A major concern is that university enrolment is dependent on matriculants passing with university exemption. This is a constraint for those who might have the resources to proceed for this type of education but have not passed with exemption. In a way they have had an option taken away from them and the actions they take might not necessarily be reflecting the effect of other variables to their destination after matric.

Despite indications from literature that schooling variables such as the type of school attended by the young person and the cost of education play a significant role in decision

making, these were not included in the model. The CAPS dataset captured the type of schooling but there were not enough observations to include the variable in the estimation. We do not have costs of tertiary in the data. However the issue of affordability can be explained partly by the economic welfare of households from which these students come, with those from poor households possibly finding tertiary education unaffordable.

Despite the above mentioned challenges, the choice for tertiary education models using both national level (LFS) data and CAPS data provide valuable insight on the important role played by perceived or expected returns on the encouraging or discouraging enrolments for tertiary education.

8 CONCLUSIONS AND RECOMMENDATIONS

Although current earnings differentials between those who completed matric and those with university education do not appear to have a significant effect on the decisions to pursue university education, the matric-college wage differential appears to be important. The model using the national Labour Force Survey sample points to increases the probability of a matriculant not enrolling for tertiary education with an increase in the matric-college wage differential. Analysis by gender shows that for males, an increase in the matric-university wage differential increases the probability of a matriculant enrolling for university education at the expense of college enrolments. However, for women, earnings differential between those with matric and college qualifications is more important, with increases in the differential resulting in increases in the probability of enrolling at a university.

The choice model using CAPS data indicates that increases in the earnings differential between those with matric and university qualifications would result in the probability of enrolling for college or university decreasing while at the same time the probability of not enrolling is increasing. The trend of matriculants moving into the labour market instead of university could be attributed to the individuals not meeting the criteria for them to be accepted for university enrolment. On the other hand increases in the matric-college earnings differential results in the probability of enrolling at a college increasing.

This study sought to understand the influence of various factors and in particular perceived differentials in returns to education on the choice for tertiary education in South Africa. However, further research is needed with regards to the strong assumptions made in this study. Expected earnings formation by 'adolescent econometricians' remains to be an area of debate among economists. An analysis of perceived earnings and actual earnings of young people in South Africa, similar to that carried out in Williams and Gordon (1981) and Betts (1996) would be helpful in the in shading more light on the discussion once an appropriate data set is available.

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APPENDIX A: SUMMARY STATISTICS

Table A1: Summary statistics of LFS September 2004 estimation sample

	AFRICAN				COLOURED				ASIAN				WHITE			
	MALE		FEMALE		MALE		FEMALE		MALE		FEMALE		MALE		FEMALE	
	mean	Std error	mean	std error	Mean	std error	Mean	std error	Mean	std error	mean	std error	mean	std error	mean	std error
ln_wage per hour	2.3517	0.0141	2.4667	0.0218	2.6074	0.0280	2.5644	0.0335	3.0949	0.0499	2.8481	0.0688	3.6132	0.0284	3.3242	0.0263
No schooling	0.0669	0.0037	0.0167	0.0025	0.0291	0.0052	0.0093	0.0035	0.0038	0.0038	0.0055	0.0055	0.0010	0.0010	0.0000	0.0000
Grade 1-11	0.5638	0.0073	0.3473	0.0095	0.6014	0.0153	0.4502	0.0181	0.3168	0.0288	0.2308	0.0313	0.1759	0.0122	0.1341	0.0118
College>grade 12	0.0818	0.0040	0.2331	0.0084	0.0660	0.0077	0.1262	0.0121	0.0954	0.0182	0.1648	0.0276	0.1502	0.0115	0.2072	0.0140
University/techinikon	0.0418	0.0029	0.0904	0.0057	0.0175	0.0041	0.0292	0.0061	0.0802	0.0168	0.0824	0.0204	0.1533	0.0116	0.1473	0.0123
Union	0.4022	0.0072	0.4580	0.0099	0.3967	0.0152	0.4130	0.0180	0.3321	0.0292	0.3132	0.0345	0.3621	0.0154	0.3018	0.0159
Experience	21.6610	0.1762	18.4663	0.1998	20.8322	0.3629	17.0823	0.3729	19.0458	0.6946	16.0824	0.7620	19.8313	0.3568	19.2838	0.3545
Experience squared	612.5495	9.0603	441.6305	8.6940	569.6178	17.3592	396.3997	14.8414	488.6565	30.6883	363.7418	28.2897	516.8601	15.4986	476.7018	14.7423
Managers,legislators	0.0225	0.0022	0.0186	0.0027	0.0407	0.0062	0.0465	0.0077	0.1565	0.0225	0.0879	0.0210	0.2459	0.0138	0.0970	0.0102
Professionals	0.0325	0.0026	0.0702	0.0051	0.0165	0.0040	0.0279	0.0060	0.0611	0.0148	0.0659	0.0184	0.0854	0.0090	0.0958	0.0102
Technical	0.0884	0.0042	0.2799	0.0089	0.0999	0.0093	0.2098	0.0148	0.1145	0.0197	0.1758	0.0283	0.1739	0.0122	0.2359	0.0147
Clerks	0.0676	0.0037	0.2145	0.0082	0.0834	0.0086	0.2961	0.0166	0.1679	0.0231	0.3626	0.0357	0.0998	0.0096	0.4395	0.0172
Services, market sales	0.1932	0.0058	0.2328	0.0084	0.1620	0.0115	0.2802	0.0164	0.1679	0.0231	0.1429	0.0260	0.1183	0.0104	0.1006	0.0104
Skilled agriculture	0.0134	0.0017	0.0071	0.0017	0.0291	0.0052	0.0053	0.0027	0.0000	0.0000	0.0055	0.0055	0.0021	0.0015	0.0012	0.0012
Craft	0.2853	0.0066	0.0805	0.0054	0.3482	0.0148	0.0664	0.0091	0.1603	0.0227	0.0495	0.0161	0.2140	0.0132	0.0192	0.0047
Agriculture	0.0739	0.0038	0.0131	0.0023	0.0960	0.0092	0.0133	0.0042	0.0305	0.0106	0.0055	0.0055	0.0432	0.0065	0.0251	0.0054
Mining	0.1170	0.0047	0.0036	0.0012	0.0446	0.0064	0.0053	0.0027	0.0000	0.0000	0.0055	0.0055	0.0751	0.0085	0.0144	0.0041
Manufacturing	0.1655	0.0055	0.1594	0.0073	0.1853	0.0121	0.1368	0.0125	0.3206	0.0289	0.2198	0.0308	0.1893	0.0126	0.0970	0.0102
Electricity	0.0130	0.0017	0.0056	0.0015	0.0116	0.0033	0.0040	0.0023	0.0038	0.0038	0.0000	0.0000	0.0257	0.0051	0.0084	0.0032
Construction	0.1241	0.0049	0.0174	0.0026	0.1688	0.0117	0.0080	0.0032	0.0420	0.0124	0.0110	0.0077	0.0247	0.0050	0.0132	0.0039
Trade	0.1451	0.0052	0.2292	0.0084	0.1581	0.0114	0.3493	0.0174	0.3130	0.0287	0.3022	0.0341	0.2088	0.0130	0.1976	0.0138
Transport	0.0676	0.0037	0.0202	0.0028	0.0640	0.0076	0.0226	0.0054	0.0534	0.0139	0.0165	0.0095	0.0741	0.0084	0.0443	0.0071
Financial	0.0916	0.0042	0.0480	0.0043	0.0650	0.0077	0.0850	0.0102	0.1107	0.0194	0.1538	0.0268	0.1358	0.0110	0.2036	0.0139
Gauteng	0.2016	0.0059	0.1614	0.0073	0.0194	0.0043	0.0372	0.0069	0.1221	0.0203	0.0714	0.0191	0.2315	0.0135	0.2012	0.0139

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Northern cape	0.0386	0.0028	0.0258	0.0032	0.2522	0.0135	0.2085	0.0148	0.0076	0.0054	0.0165	0.0095	0.0802	0.0087	0.0886	0.0098
Eastern cape	0.0838	0.0041	0.1305	0.0067	0.1300	0.0105	0.1222	0.0119	0.0076	0.0054	0.0055	0.0055	0.1080	0.0100	0.1126	0.0109
Free state	0.1018	0.0045	0.1031	0.0061	0.0369	0.0059	0.0465	0.0077	0.0115	0.0066	0.0000	0.0000	0.0823	0.0088	0.1150	0.0110
Kwazulu-Natal	0.2391	0.0063	0.2756	0.0089	0.0310	0.0054	0.0438	0.0075	0.7863	0.0254	0.8681	0.0251	0.1327	0.0109	0.1090	0.0108
North west	0.0988	0.0044	0.1051	0.0061	0.0165	0.0040	0.0159	0.0046	0.0153	0.0076	0.0110	0.0077	0.0504	0.0070	0.0479	0.0074
Limpopo	0.0847	0.0041	0.0872	0.0056	0.0010	0.0010	0.0013	0.0013	0.0267	0.0100	0.0110	0.0077	0.0504	0.0070	0.0371	0.0065
Mpumalanga	0.1137	0.0047	0.0801	0.0054	0.0029	0.0017	0.0066	0.0030	0.0191	0.0085	0.0055	0.0055	0.0700	0.0082	0.0491	0.0075
Age	37.6457	0.1479	36.6063	0.1810	37.1348	0.3229	34.7198	0.3412	37.5000	0.6531	34.7637	0.7227	39.0381	0.3561	38.6431	0.3510
Age squared	1518.000	11.809	1422.571	13.840	1486.417	25.015	1293.025	24.801	1517.592	51.722	1303.049	52.069	1647.069	28.655	1596.030	27.747
Household size	2.7243	0.0256	2.9286	0.0338	3.2978	0.0524	3.2404	0.0665	3.3053	0.1066	3.2088	0.0992	2.6019	0.0370	2.4252	0.0351
Observations	4617		2522		1031		753		262		182		972		835	

Notes
(1) Reference group matric education, plant and machinery operators, services industry western province.
(2) Those employed in private households and foreign areas not included.

Table A2: Summary statistics of LFS March 2005 Estimation Sample

	No tertiary		University		College	
	mean	std error	Mean	std error	Mean	std error
Δ in returns to university	0.7750229	0.0145911	0.7108584	0.0309366	0.7610917	0.0300591
Δ in returns to college	0.3497715	0.0038195	0.2955759	0.0110267	0.3470628	0.0115965
Household grant-1 person	0.099386	0.0066736	0.0812671	0.0155616	0.0783331	0.0167394
Household grant-> 1 person	0.0301531	0.0039941	0.0045419	0.0030832	0.0166883	0.0078365
Male	0.4729276	0.0130174	0.5106699	0.0319773	0.487214	0.0400182
White	0.1108242	0.0087424	0.3505112	0.0323598	0.1256784	0.0259202
Log per capita hourly earnings	6.469557	0.0352332	7.496007	0.0804131	6.857968	0.0949614
Free State	0.0639708	0.0053165	0.040917	0.0096233	0.070081	0.0153602
Kwa Zulu Natal	0.2554595	0.0115245	0.1735256	0.0223271	0.1049717	0.0182243
Mpumalanga	0.0695164	0.0055193	0.0251859	0.00677	0.0398442	0.010958
Gauteng	0.2579666	0.0129229	0.3904512	0.0315848	0.435124	0.041539
Eastern Cape	0.0900777	0.0064811	0.0776585	0.0140167	0.1168383	0.0198586
North West	0.0707234	0.0056839	0.0669506	0.0174105	0.0612802	0.0162307
Limpopo	0.0595077	0.0053305	0.0340493	0.0089175	0.0368243	0.0121468
Northern Cape	0.01803	0.0018873	0.0054997	0.0019473	0.0207106	0.0049238
Observations	2848		409		279	

Notes: Reference categories no grant, western province, Dummy variables represent proportions

Table A3: Summary statistics of LFS March 2005 Estimation Sample: MALES

	No tertiary		University		College	
	mean	std error	Mean	std error	Mean	std error
Δ in returns to university	0.7492232	0.0023932	0.7434575	0.0084925	0.7398687	0.0031645
Δ in returns to college	0.3275996	0.0045679	0.315399	0.010133	0.3285748	0.0131678
Household grant-1 person	0.0845382	0.0086925	0.0620607	0.0172409	0.0596762	0.0215058
Household grant-> 1 person	0.0306972	0.0054674	0.0063463	0.0057622	0.0216812	0.0139187
White	0.1177762	0.0126147	0.3408922	0.0476527	0.1155421	0.031915
Log per capita hourly earnings	6.56532	0.0486536	7.436336	0.1064353	7.014063	0.1166196
Free State	0.0640532	0.0072449	0.0226564	0.0095525	0.0612029	0.0223313
Kwa Zulu Natal	0.2656496	0.0176378	0.1527515	0.0300975	0.1054298	0.0280284
Mpumalanga	0.0781825	0.0092772	0.0340295	0.0111736	0.04236	0.0164958
Gauteng	0.2374021	0.017913	0.4166836	0.0464548	0.4341034	0.059095
Eastern Cape	0.0993342	0.0101108	0.0911152	0.021773	0.0960487	0.0269968
North West	0.0647004	0.0081045	0.0636919	0.0302619	0.0756511	0.0255104
Limpopo	0.0571744	0.0076554	0.0412302	0.0140633	0.0333026	0.0184964
Northern Cape	0.019702	0.0028063	0.0062079	0.0030876	0.0141586	0.0063606
Observations	1316		197		120	

Notes: Reference categories no grant, western province, Dummy variables represent proportions

Table A4: Summary statistics of LFS March 2005 Estimation Sample: FEMALES

	No tertiary		University		College	
	mean	std error	mean	std error	Mean	std error
Δ in returns to university	0.803813	0.0466	0.676838	0.062352	0.781256	0.058881
Δ in returns to college	0.313177	0.011286	0.274888	0.019599	0.364629	0.018841
Household grant-1 person	0.116685	0.016353	0.101311	0.025991	0.09606	0.025557
Household grant-> 1 person	0.034697	0.010671	0.002659	0.001898	0.011944	0.00768
White	0.207303	0.024458	0.36055	0.04385	0.135309	0.040381
Log per capita hourly earnings	7.063241	0.075853	7.55828	0.121184	6.709658	0.148044
Free State	0.071348	0.014076	0.059974	0.01688	0.078517	0.021292
Kwa Zulu Natal	0.211077	0.022012	0.195206	0.033	0.104537	0.023634
Mpumalanga	0.048676	0.009066	0.015957	0.007519	0.037454	0.014582
Gauteng	0.283764	0.029395	0.363075	0.042277	0.436094	0.058592
Eastern Cape	0.102438	0.015112	0.063615	0.017506	0.136591	0.029213
North West	0.05506	0.010723	0.070351	0.016636	0.047626	0.020414
Limpopo	0.04076	0.009326	0.026555	0.01085	0.04017	0.015979
Northern Cape	0.01796	0.004303	0.004761	0.002347	0.026936	0.007544
Observations	603		212		159	

Notes: Reference categories no grant, western province, Dummy variables represent proportions

Table A5: Summary statistics estimation Sample: CAPS wave 3

	No tertiary		University		College	
	mean	Std error	mean	std error	Mean	std error
Δ in returns to university	.7265692	.0143058	.5951862	.018979	.6466805	.0214049
Δ in returns to college	.212662	.0107024	.1889805	.0132384	.1999854	.0206962
Log per capita hourly income	6.917034	.069259	7.720984	.091907	6.967373	.1524275
White	.0950226	.0197707	.4213836	.091907	.2560976	.0484974
Male	.4253394	.0333321	.3962264	.0389117	.5487805	.0552905
Father's education<matric	.7692308	.0284057	.427673	.0393595	.5853659	.0547399
Father's education>matric	.081448	.0184408	.3836478	.0386859	.1707317	.0418083
Mother's education<matric	.8235294	.0257018	.4339623	.0394294	.5853659	.0547399
Mother's education>matric	.0633484	.0164227	.3773585	.0385627	.1829268	.0429563
Mother resident	.7420814	.0294955	.8050314	.0315181	.8170732	.0429563
Pressure from parents	.7873303	.027588	.3333333	.0375029	.5365854	.0554066
Friends at Tertiary	.800905	.0269221	.9685535	.0138842	.9146341	.0310473
Pupil-teacher ratio	.2669683	.1890269	3.402516	.7020572	5.512195	1.319057
Pupil-teacher ratio missing	.9909502	.0063846	.8679245	.0269354	.8170732	.0429563
Ability	.1893055	.0419157	.237189	.044565	.0776201	.0710832
Observations	221		159		82	

Notes: Reference categories for mother's education is matric, Dummy variables represent proportions

APPENDIX B: HECKMANS SELECTION MODELS

Table B1: Returns to education for Males using Heckman's Maximum Likelihood method.

	BLACK			COLOURED			INDIAN			WHITE		
	Coef.	Std. error	P>|z|	Coef.	Std. error	P>|z|	Coef.	Std. error	P>|z|	Coef.	Std. error	P>|z|
Earnings Equation												
ln_wage per hour												
No schooling	-0.636	0.057	0.000	-0.434	0.161	0.007	-0.864	0.616	0.161	-0.882	0.755	0.243
Grade 1-11	-0.362	0.032	0.000	-0.345	0.079	0.000	-0.290	0.106	0.006	-0.129	0.075	0.084
College>grade 12	0.325	0.049	0.000	0.090	0.107	0.399	0.402	0.130	0.002	0.242	0.078	0.002
University/ techinikon	0.556	0.081	0.000	0.562	0.228	0.014	0.715	0.190	0.000	0.515	0.086	0.000
Union	0.450	0.024	0.000	0.374	0.048	0.000	0.319	0.083	0.000	-0.004	0.050	0.940
Experience	0.028	0.005	0.000	0.007	0.012	0.542	0.051	0.023	0.024	0.005	0.009	0.612
Experience squared	0.000	0.000	0.000	0.000	0.000	0.906	-0.001	0.000	0.062	0.000	0.000	0.081
Managers,legislators	0.761	0.073	0.000	0.725	0.117	0.000	0.694	0.135	0.000	0.598	0.102	0.000
Professionals	0.421	0.089	0.000	0.193	0.227	0.396	0.530	0.059	0.012	0.467	0.129	0.000
Technical	0.313	0.049	0.000	0.200	0.090	0.026	0.653	0.241	0.007	0.330	0.104	0.001
Clerks	0.222	0.046	0.000	0.032	0.089	0.716	0.433	0.146	0.003	0.140	0.111	0.207
Services, market sales	-0.094	0.039	0.015	-0.149	0.078	0.058	0.251	0.132	0.058	-0.015	0.111	0.890
Skilled agriculture	-0.124	0.091	0.171	-0.208	0.132	0.115	0.100	0.136	0.461	-0.788	0.516	0.127
Craft	0.016	0.030	0.605	-0.150	0.064	0.019	0.248	0.127	0.050	0.089	0.098	0.364
Agriculture	-0.754	0.053	0.000	-0.769	0.099	0.000	0.039	0.235	0.867	-0.362	0.125	0.004
Mining	-0.053	0.045	0.245	0.263	0.115	0.022	-0.754	0.091	0.118	0.468	0.102	0.000
Manufacturing	-0.200	0.041	0.000	-0.276	0.077	0.000	-0.061	0.132	0.642	0.162	0.075	0.030
Electricity	0.017	0.091	0.856	0.000	0.204	1.000	0.712	0.645	0.270	0.205	0.149	0.170
Construction	-0.492	0.049	0.000	-0.299	0.088	0.001	-0.404	0.225	0.073	-0.201	0.147	0.172
Trade	-0.439	0.039	0.000	-0.365	0.075	0.000	-0.308	0.137	0.025	-0.244	0.073	0.001
Transport	-0.312	0.051	0.000	-0.002	0.100	0.986	0.044	0.194	0.819	0.153	0.098	0.116

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	BLACK			COLOURED			INDIAN			WHITE		
	Coef.	Std. error	P>|z	Coef.	Std. error	P>|z|	Coef.	Std. error	P>|z|	Coef.	Std. error	P>|z|
Financial	-0.338	0.044	0.000	-0.321	0.096	0.001	0.011	0.151	0.942	0.104	0.077	0.178
Gauteng	0.053	0.056	0.349	0.378	0.157	0.016	0.074	0.592	0.901	-0.092	0.080	0.246
Northern cape	-0.014	0.073	0.844	-0.267	0.054	0.000	-0.714	0.706	0.312	-0.167	0.111	0.132
Eastern cape	-0.202	0.064	0.002	-0.001	0.067	0.990	-1.240	0.787	0.115	-0.173	0.099	0.079
Free state	-0.304	0.061	0.000	-0.005	0.115	0.964	0.048	0.702	0.946	-0.174	0.110	0.112
Kwazulu-Natal	-0.122	0.056	0.030	-0.221	0.124	0.074	-0.183	0.608	0.763	-0.431	0.096	0.000
North west	-0.200	0.062	0.001	-0.053	0.168	0.751	0.035	0.667	0.958	-0.189	0.130	0.144
Limpopo	-0.244	0.063	0.000	1.004	0.749	0.180	0.057	0.650	0.930	-0.395	0.135	0.003
Mpumalanga	-0.229	0.059	0.000	0.675	0.394	0.087	-0.393	0.685	0.566	-0.296	0.119	0.013
Constant	2.443	0.100	0.000	3.119	0.209	0.000	2.335	0.789	0.003	3.683	0.150	0.000
Employment Equation												
Employed or not												
No schooling	-0.694	0.050	0.000	-0.902	0.135	0.000	-1.359	0.640	0.034	-0.334	0.733	0.649
Grade 1-11	-0.414	0.030	0.000	-0.494	0.064	0.000	-0.416	0.136	0.002	-0.229	0.075	0.002
College>grade 12	0.624	0.065	0.000	0.530	0.165	0.001	0.000	0.235	0.999	0.012	0.089	0.895
University/technikon	0.716	0.095	0.000	0.012	0.258	0.961	-0.048	0.247	0.845	-0.035	0.089	0.697
Age	0.256	0.006	0.000	0.240	0.013	0.000	0.280	0.031	0.000	0.227	0.014	0.000
Age squaredg	-0.003	0.000	0.000	-0.003	0.000	0.000	-0.003	0.000	0.000	-0.003	0.000	0.000
Gauteng	0.003	0.068	0.967	-0.375	0.182	0.039	0.830	0.683	0.224	0.209	0.084	0.013
Northern cape	0.048	0.089	0.592	-0.136	0.060	0.024	0.193	0.859	0.822	0.348	0.122	0.004
Eastern cape	-0.533	0.071	0.000	0.114	0.081	0.160	8.727	0.552	1.000	0.260	0.106	0.014
Free state	-0.082	0.072	0.259	-0.107	0.148	0.469	1.457	0.890	0.101	0.283	0.117	0.015
Kwazulu-Natal	-0.227	0.066	0.001	0.066	0.158	0.678	1.232	0.671	0.066	0.666	0.109	0.000
North west	-0.327	0.071	0.000	-0.206	0.203	0.308	0.859	0.795	0.280	0.199	0.137	0.147
Limpopo	-0.362	0.072	0.000	0.574	1.230	0.641	1.218	0.757	0.108	0.559	0.155	0.000
Mpumalanga	0.091	0.072	0.203	0.356	0.548	0.516	1.251	0.817	0.125	0.429	0.131	0.001
Household size	-0.156	0.007	0.000	-0.091	0.015	0.000	-0.025	0.035	0.483	-0.068	0.021	0.001
Constant	-4.493	0.131	0.000	-3.975	0.239	0.000	-6.039	0.875	0.000	-4.030	0.277	0.000

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	BLACK			COLOURED			INDIAN			WHITE		
	Coef.	Std. error	P>|z|	Coef.	Std. Error	P>|z|	Coef.	Std. error	P>|z|	Coef.	Std. error	P>|z|
Atthrho	-0.203	0.064	0.001				0.316	0.443	0.476	-1.313	0.093	0.000
lnsigma/inverse mills ratio*	-0.392	0.013	0.000	-0.330	0.129	0.010	-0.579	0.085	0.000	-0.084	0.035	0.018
Rho	-0.200	0.061		-0.475			0.306	0.402		-0.865	0.024	
Sigma	0.676	0.009		0.695			0.560	0.047		0.920	0.033	
Lambda	-0.135	0.042		-0.330	0.129		0.171	0.238		-0.796	0.047	
Censored Observations	15210			2180			291					
Uncensored Observations	4617			1031			262			972		

Notes:
(1) The dependent variables for the earnings and employment equations given in italics.
(2)The reference category for education in both equations is matric.
(3) Household size is the exclusive restriction included in the employment equation.
(4) Estimations for coloured males by two step procedure.

Table B1: Returns to education for Females using Heckman's Maximum Likelihood method.

	BLACK			COLOURED			INDIAN			WHITE		
	Coef.	Std. error	P>|z|	Coef.	Std. error	P>|z|	Coef.	Std. error	P>|z|	Coef.	Std. error	P>|z|
Earnings Equation												
ln_wage per hour												
No schooling	-0.642	0.140	0.000	0.156	0.280	0.578	-0.472	0.666	0.478			
Grade 1-11	-0.360	0.056	0.000	0.051	0.094	0.592	-0.403	0.173	0.019	0.009	0.080	0.908
College>grade 12	0.363	0.058	0.000	0.175	0.104	0.091	0.447	0.206	0.030	-0.008	0.072	0.912
University/Techinikon	0.524	0.093	0.000	0.558	0.210	0.008	1.494	0.320	0.000	0.151	0.094	0.109
Union	0.552	0.032	0.000	0.346	0.052	0.000	0.221	0.111	0.047	0.126	0.050	0.012
Experience	0.024	0.007	0.001	0.001	0.011	0.893	0.080	0.019	0.000	-0.015	0.009	0.116
Experience squared	0.000	0.000	0.029	0.000	0.000	0.241	-0.002	0.001	0.000	0.001	0.000	0.001
Managers,legislators	0.843	0.120	0.000	0.663	0.150	0.000	0.883	0.239	0.000	0.764	0.216	0.000
Professionals	0.549	0.109	0.000	0.686	0.213	0.001	-0.392	0.367	0.286	0.783	0.226	0.001
Technical	0.355	0.077	0.000	0.512	0.121	0.000	0.441	0.249	0.076	0.555	0.210	0.008
Clerks	0.222	0.073	0.002	0.456	0.114	0.000	0.298	0.192	0.120	0.286	0.206	0.166
Services, market sales	-0.177	0.074	0.016	0.068	0.116	0.556	0.002	0.212	0.994	0.090	0.215	0.676
Skilled agriculture	0.042	0.193	0.826	-0.307	0.339	0.365	-0.196	0.619	0.751	-0.242	0.615	0.694
Craft	-0.112	0.068	0.099	0.005	0.124	0.970	-0.083	0.242	0.733	0.490	0.259	0.059
Agriculture	-0.538	0.144	0.000	0.008	0.212	0.969	0.342	0.236	0.260	0.091	0.142	0.522
Mining	-0.294	0.229	0.199	1.026	0.326	0.002	0.169	0.646	0.794	0.195	0.186	0.293
Manufacturing	-0.379	0.064	0.000	0.211	0.095	0.027	-0.554	0.183	0.002	0.102	0.080	0.205
Electricity	0.215	0.184	0.242	0.348	0.354	0.326	0.505	0.448	0.345	0.605	0.243	0.013
Construction	-0.092	0.116	0.428	-0.105	0.255	0.681	-0.697	0.177	0.260	0.066	0.192	0.731
Trade	-0.451	0.042	0.000	-0.255	0.067	0.000	-0.610	0.367	0.000	-0.179	0.069	0.009
Transport	0.174	0.099	0.079	0.515	0.163	0.002	0.046	0.160	0.097	0.103	0.108	0.342
Financial	-0.094	0.067	0.159	0.015	0.095	0.874	0.325	0.234	0.773	0.142	0.062	0.022

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	BLACK			COLOURED			INDIAN			WHITE		
	Coef	Std . error	P> |z|	Coef	Std . error	P> |z|	Coef	Std . error	P> |z|	Coef	Std . error	P> |z|
Gauteng	0.007	0.083	0.935	0.108	0.146	0.462	-0.718	0.553	0.194	0.143	0.078	0.067
Northern cape	-0.127	0.114	0.263	-0.056	0.070	0.427	-0.627	0.672	0.351	-0.246	0.103	0.017
Eastern cape	-0.319	0.087	0.000	0.004	0.084	0.959	-3.989	0.847	0.000	-0.014	0.094	0.883
Free state	-0.388	0.087	0.000	-0.192	0.132	0.147	-0.122	0.455	0.527	-0.223	0.094	0.017
Kwazulu-Natal	-0.280	0.081	0.001	-0.124	0.138	0.370	-0.330	0.521	0.262	-0.047	0.097	0.629
North west	-0.253	0.088	0.004	-0.036	0.211	0.865	-0.782	0.697	0.034	0.173	0.126	0.169
Limpopo	-0.489	0.092	0.000	-0.714	0.776	0.357	-0.390	0.691	0.573	-0.073	0.145	0.613
Mpumalanga	-0.395	0.090	0.000	-0.060	0.353	0.865	-0.673	0.919	0.464	0.061	0.128	0.633
Constant	2.272	0.156	0.000	2.731	0.175	0.000	1.925	0.592	0.001	3.409	0.241	0.000
Employment Equation												
Employed or not												
No schooling	-1.619	0.074	0.000	-1.663	0.182	0.000	-1.199	0.533	0.025	-6.716	24018.230	1.000
Grade 1-11	-0.845	0.032	0.000	-0.945	0.061	0.000	-0.613	0.137	0.000	-0.386	0.076	0.000
College>grade 12	1.022	0.053	0.000	0.527	0.125	0.000	0.719	0.219	0.001	0.211	0.080	0.009
University/technikon	1.253	0.091	0.000	0.469	0.246	0.057	0.440	0.269	0.102	0.216	0.094	0.021
Age	0.206	0.009	0.000	0.206	0.016	0.000	0.158	0.035	0.000	0.189	0.017	0.000
Age squaredg	-0.002	0.000	0.000	-0.003	0.000	0.000	-0.002	0.000	0.000	-0.002	0.000	0.000
Gauteng	-0.126	0.084	0.131	0.128	0.154	0.406	-0.373	0.633	0.555	0.016	0.085	0.850
Northern cape	-0.120	0.109	0.270	-0.215	0.064	0.001	0.429	0.819	0.601	0.129	0.113	0.254
Eastern cape	-0.332	0.085	0.000	-0.005	0.082	0.955	-0.141	0.923	0.878	0.119	0.104	0.253
Free state	-0.133	0.087	0.127	0.156	0.135	0.249	-6.956	53092.520	1.000	0.217	0.105	0.039
Kwazulu-Natal	-0.219	0.080	0.006	0.281	0.150	0.061	0.466	0.615	0.449	0.219	0.109	0.045
North west	-0.336	0.087	0.000	-0.134	0.207	0.516	-0.490	0.743	0.509	-0.038	0.132	0.777
Limpopo	-0.575	0.088	0.000	0.007	0.911	0.994	-0.388	0.752	0.606	0.044	0.159	0.783
Mpumalanga	-0.228	0.089	0.010	0.328	0.440	0.456	-0.053	1.038	0.959	-0.098	0.132	0.457
Household size	-0.095	0.008	0.000	-0.045	0.013	0.000	-0.076	0.034	0.028	-0.133	0.023	0.000
Constant	-4.139	0.180	0.000	-3.551	0.277	0.000	-3.050	0.869	0.000	-3.259	0.317	0.000

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	BLACK			COLOURED			INDIAN			WHITE		
	Coef	Std . error	P> |z|	Coef	Std . error	P> |z|	Coef	Std . error	P> |z|	Coef	Std . error	P> |z|
Atthrho	-0.088	0.087	0.312	-1.134	0.125	0.000	1.113	0.254	0.000	-1.271	0.099	0.000
Lnsigma	-0.401	0.015	0.000	-0.157	0.055	0.004	-0.227	0.109	0.036	-0.147	0.042	0.000
Rho	-0.088	0.087		-0.812	0.042		0.805	0.089		-0.854	0.027	
Sigma	0.670	0.010		0.855	0.047		0.797	0.086		0.863	0.036	
Lambda	-0.059	0.058		-0.695	0.072		0.641	0.136		-0.738	0.051	
Censored Observations	19893			3097			439			1351		
Uncensored Observations	2522			753			182			835		

Notes:
(1) The dependent variables for the earnings and employment equations given in italics.
(2)The reference category for education in both equations is matric.
(3) Household size is the exclusive restriction included in the employment equation.

APPENDIX C: TESTS FOR COMBINED OUTCOMES.

Ho: All coefficients except intercepts associated with given pair of outcomes are 0 (i.e., categories can be collapsed).

Where 1 is not enrolled , 2 enrolled at University and 3 enrolled at FET/college

Table C1: Wald tests for combining outcome categories: Overall LFS March 2005

Categories tested		chi2	df	P>chi2
2-	3	51.441	15	0.000
2-	3	149.293	15	0.000
3-	1	57.796	15	0.000

Table C2: Wald tests for combining outcome categories: Males

Categories tested		chi2	df	P>chi2
2-	3	32.265	14	0.004
2-	1	73.428	14	0.000
3-	1	30.122	14	0.007

Table C3: Wald tests for combining outcome categories: Females

Categories tested		chi2	df	P>chi2
2-	3	41.647	14	0.000
2-	1	99.767	14	0.000
3-	1	42.386	14	0.000

Table C4: Wald tests for combining outcome categories Overall CAPS wave 3

Categories tested		df	P>chi2
2-	3	11	0
2-	1	11	0
3-	1	11	0.03

APPENDIX D: TESTS FOR THE INDEPENDENCE OF IRRELEVENT ALTERNATIVES.

Ho: Odds (Outcome-J vs Outcome-K) are independent of other alternatives.

Where 1 is not enrolled , 2 enrolled at University and 3 enrolled at FET/college

Table D1: Tests of IIA Assumption: Overall LFS Sample

Hausman tests

Omitted	chi2	df	P>chi2	evidence	
2	-10.016	16	0.866	for	Ho
3	-0.825	16	1.000	for	Ho

Small-Hsiao tests

Omitted	lnL(full)	lnL(omit)	chi2	df	P>chi2	Evidence	
2	-491.115	-510.623	-39.015	16	1.000	for	Ho
3	-575.703	-657.627	-163.850	16	1.000	for	Ho

Table D2: Tests of IIA Assumption by Males

Hausman tests

Omitted	chi2	df	P>chi2	Evidence	
2	-1.088	15	1.000	for	Ho
3	-1.148	15	1.000	for	Ho

Small-Hsiao tests

Omitted	lnL(full)	lnL(omit)	chi2	df	P>chi2	Evidence	
2	-232.191	-197.504	69.373	15	0.000	Against	Ho
3	-290.444	-331.593	-82.297	15	1.000	For	Ho

Table D3: Tests of IIA Assumption by Females

Hausman tests

Omitted	chi2	df	P>chi2	evidence	
2	-3.246	15	1.000	for	Ho
3	1.189	15	1.000	for	Ho

Small-Hsiao tests

Omitted	lnL(full)	lnL(omit)	chi2	df	P>chi2	Evidence	
2	-269.276	-251.840	34.872	15	0.003	Against	Ho
3	-285.809	-308.907	-46.196	15	1.000	For	Ho

Table D4: Tests of IIA Assumption CAPS

Hausman tests

Omitted	chi2	df	P>chi2	evidence	
2	0.054	24	1	for	Ho
3	-11.373	24	1	for	Ho

Small-Hsiao tests

Omitted	lnL(full)	lnL(omit)	chi2	df	P>chi2	evidence	
2	-190.947	-171.408	39.078	12	0	against	Ho
3	-194.948	-170.091	49.714	12	0	against	Ho

APPENDIX E: STANDARDIZED LITERACY AND NUMERACY SCORES REGRESSION

	Coefficient	Robust std error
Age	0.0558***	0.0075
Male	-0.0044	0.0295
Coloured	0.2900***	0.0423
Indian	0.4784**	0.1832
White	0.7389***	0.0670
Test in Own language	0.1332***	0.0398
Father's education	-0.0163	0.0124
Father's education squared	0.0019**	0.0008
Mother's education	0.0268*	0.0144
Mother's education squared	0.0012	0.0010
Mother's education missing	0.0575	0.0455
Father's education missing	-0.0312	0.0483
Proportion of life lived with mother	0.0672	0.0666
Proportion of life lived with father	0.0354	0.0428
Mother helped with homework	-0.1626	0.0440
Father helped with homework	0.0150	0.0537
Log per capita income	0.0862	0.0167
Own books more than 5	0.1948	0.0393
Own computer	0.2707	0.0456
Pupil-teacher ratio	-0.0009	0.0060
Pupil-teacher ratio missing	0.0161	0.2247
Ex DET	0.3207	0.2013
Ex HOA	0.6263	0.2091
Ex HOR	0.5163	0.2026
NED	0.4442	0.1496
Former department missing	0.3212	0.1726
Constant	-2.9703	0.3275
R squared	0.4512	
Observations	2796	

Note
(1) Robust standard errors in parentheses.
(2) * Significant at the 10 percent level; ** Significant at the 5 percent level; *** Significant at the 1 percent level.
(3) Survey weights used in estimations.