The determinants of academic outcomes:
A competing risks approach

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Abstract

This study evaluates the determinants of both dropout and degree completion at university. Using discrete-time methods for competing risks event history analysis, we analyse the outcomes for students enrolled at a large South African university. Findings from the study indicate individuals registered for 3-year degrees graduate at higher rates relative to individuals who complete 4-year degrees. Students from the Science and Engineering faculties are more likely to be academically excluded relative to Commerce and Humanities students. Having failed at least one course during the first year of registration does not impact on the duration of studies for those who eventually graduate, but does significantly impact on those who are academically excluded from university. Individuals who are on financial aid are found to graduate at slower rates relative to students with other sources of funding. In contrast, individuals on financial aid exit the system much quicker when exit is based on academic exclusion. Finally, residence-based students also graduate at slower rates relative to students who are not based in residence.

Keywords: graduation rates; dropout rates; higher education, economics of education, competing risks

1. INTRODUCTION

Significant attention has been devoted to the higher education dropout phenomenon worldwide. Interest in the topic in South Africa is largely driven by the inequities in education attainment that the country has struggled to address since the advent of democracy. While education attainment remains significantly skewed toward the white population group and those within the middle class, it is also linked to intergenerational persistence of incomes and wealth.

South Africa has one of the lowest higher education completion rates in the world, last measured at 15%[1] nationally (Letseka and Maile, 2008). The low population share of tertiary graduates at 6% of the adult population is significantly lower than other middle-income and developed economies (OECD, 2013). Within this group the proportion of White individuals with completed higher education is significantly higher than that of the African population (Lam *et al*., 2013). A recent study by the Council on Higher Education (CHE) (2011) revealed that 45% of the entire South African national 2006 first time-entering cohort studying towards a university-level qualification had dropped out after seven years in the system, with 55% of the cohort graduating after the same period of time. Only 33% had graduated on time. Nationally, Coloured students have higher dropout rates than graduation rates, with significantly higher dropout rates and significantly lower graduation rates relative to Indian and White students. For African students, completion rates are equal to dropout rates across both degree types (3 and 4 year degrees). For fields such as law and engineering students are more likely to drop out than they are to graduate after seven years of enrolment (CHE, 2011).

Students' academic career paths may vary significantly. Some students will complete degrees in the minimum specified time, while others may take a few years longer to complete the same degree. Some students may take a break during their studies and return to complete their degrees at a later stage, commonly known as stopout. Other students might change degrees completely and possibly start from scratch, depending on how transferable subjects are between degrees. Some students may drop out and not return to their studies, incurring costs not only to themselves but to society at large. The costs imposed on individuals and society when students do not complete tertiary education, both direct and indirect, are high. Student debt remains even though the individual has not completed their education. The National Treasury reported that the high dropout rate was costing taxpayers approximately R4.5 billion over the period 2000-2005 (Letseka and Maile, 2008).

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[1] Measured in 2000.

Given concerns around the quality of the education system in South Africa, understanding when dropout is most likely to occur will assist policy-makers to better tailor interventionist policies in the education sector, potentially leading to improved outcomes for education retention and attainment in higher education. As a consequence it is important to identify those factors which influence students' decision to drop out or persist with their studies. From the university's perspective this important in terms of resource allocation. The number of universities in South Africa is increasing while the funds available to support institutions are not increasing fast enough to support a growing body of students requiring financial support. From the student's perspective the cost of acquiring a tertiary education is high and better information will assist students to make more informed decisions. Improving the performance of both students and the higher education sector should be core to a society like South Africa.

For these reasons many studies have been conducted in other countries, focusing on student outcomes during college or university (Montmarquette, Mahseredjian and Houle, 2001; Scott and Kennedy, 2005). However many studies do not focus on the temporal aspect of student decision making. Furthermore, assuming a continuous time model skews results as the exact timing of dropout or stopout is often not known (Singer and Willett, 1993; Scott and Kennedy, 2005; Arias Ortiz and Dehon, 2011). Assuming a single-risk model is also not appropriate as some outcomes do compete with others – if a student graduates then dropping out is not a possibility.

The temporal nature of higher education cannot be discounted as students' academic paths and outcomes are not linear. The complex paths that students follow necessitate the need to implement a survival analysis approach to analysing student outcomes (Singer and Willet, 1991; Arias Ortiz and Dehon, 2013). A key assumption of many previous studies focussed on the exact timing of events or outcomes. This assumption has been shown to be unrealistic (Singer and Willet, 1991; Scott and Kennedy, 2005), indicating the need for discrete-time based analysis. The importance of these two issues have been documented in more recent studies, as researchers try to analyse increasingly complex university educational histories. Single-risk models assuming event independence has been shown to be inappropriate as educational outcomes are highly complex, interdependent and competing (Desjardins et al, 2003, Desjardins et al, 1999).

Time to dropout or degree completion can be determined by several factors. This chapter will focus on the following aspects. First, I investigate if African students are more likely than Coloured, Indian and White students to dropout and graduate. I also investigate this by gender. Second, I investigate the influence of financial aid on the probability of dropout and degree completion. Lastly, I attempt to investigate any impact high school type might have on academic outcomes in higher education.

The aim of this chapter is two-fold. First, this work will assist university administrators to identify those factors which play a role in predicting student success and dropout. This is especially important where the schooling system varies significantly in quality between the public and private spheres of the primary and secondary education sector (Spaull, 2013). Moreover, as universities are adapting admission criteria to ensure greater access and equity in student enrolments, understanding those factors which contribute to success is critical. Many view a university education as the gateway to some of the most lucrative and well-paying jobs in the labour market, student potential to succeed in higher education is significant in terms of equity and access. This chapter also contributes to the research on performance in higher education by examining the variation in performance over time. This will enable university administrators to identify key bottlenecks in student progression while allowing for greater targeting in terms of academic interventions. Lastly, it will assist to inform the types of interventions which might be necessary at different levels of study, and by faculty or discipline.

Thus we aim to study how the characteristics of degree courses and individual students affect the competing outcomes of students in a higher education setting. Focusing on one higher education institution, the University of Cape Town, allows us to control for effects that are experienced by students facing the same organisational context, level of academic support and other services.

The rest of the paper is structured as follows. The next section presents the literature on the determinants of dropout, degree completion and other relevant previous research. Section 4 describes the data used in this study. Empirical results are discussed in section 5. The final section considers conclusions and the implications of the results of this study.

2. LITERATURE REVIEW

There is a substantial literature on the factors that determine university attrition or dropout. Tinto's (1975), Bean's (1980) and the College Choice Nexus Model (St John, Cabrera, Nora and Asker, 2000) are the most comprehensive theoretical models of student attrition. Emerging from the psychology literature, Tinto's (1975) student integration model theorises that students assimilate and interact with their environment on two key levels. The first interaction is an academic one where the student interacts with faculty and staff. The second is the social component of interaction with peers and participation in extracurricular activities. One of the first longitudinal studies of dropout behaviour, Tinto posits that students who integrate both academically and socially into the

university community are more likely to feel a sense of belonging within the institution and therefore more likely to graduate. Thus the interaction between students and the institution ultimately impact on a student's decision to persist or not. While acknowledging the importance of external factors such as job market opportunities and home background, a major shortcoming of this model is the exclusion of said external factors to the institutional environment which Tinto assumes to be given and constant. Bean's (1980) student attrition model builds on and is slightly more comprehensive than Tinto's (1975) model in that it includes external factors such as employment opportunities as well as behavioural factors as predictors of persistence. The College Nexus Model (St. John et al, 2000) suggests there is a strong relationship between a student's college choice and persistence in college (St. John et al, 2000). The model posits a three-stage process. Socio-economic and academic ability factors affect whether a student goes to college. Next, the student compares the costs and benefits of attending a given college. Once enrolled, the student's college experiences and academic performance affect whether the student drops out or continues (St. John et al, 2000). The authors find that financial aid positively impacts of student retention as it decreases the cost of attending college. Poor grades and other negative college experiences impact negatively on persistence and thus make it more likely for students to dropout (St. John et al, 2000).

Horn (1998) finds that students who dropout are more likely to be older, have children, work fulltime. Completion of all first year subjects is an important determinant for year two enrolment and successful completion. Light (1998) finds that local wage rates and unemployment rates are statistically significant in determining academic success and persistence of studies. Financial aid is an important determinant for both graduation and dropout (Ishitani and DesJardins (2002), Stratton et al (2008), Sampiao (2012)).

Ishitani and DesJardins (2002) found that dropout rates vary with both the value and timing of financial aid. Stratton et al (2008) focus on the determinants of dropout and stopout. Stopout is defined as the temporary absence from the college enrolment. While stopout is considered to be more short-term in nature, drop-out is deemed to be a more long-term phenomenon. Employing a multinomial logit, they find significant differences between stopout and dropout. The type of financial aid received is an important determinant of both phenomena. Financial aid is significantly more important for dropout than stopout, as financial aid typically equals loans which have to be repaid. Sampiao (2012) studies students in the Brazilian higher education system. Implementing a variation of a survival data model, the author finds that better performance in the entrance exam is correlated with a positive increase in the probability of dropout for earlier quantiles but significantly decreases the probability of dropout for higher quantiles. However, once degree major fixed effects are included to control for differences in degree types, entrance scores become positively correlated with the probability of dropout at all quantiles of the distribution. Students in majors with low entrance requirements are more likely to switch majors.

The empirical literature can be broken down into two broad approaches. The first area is the static type models of OLS-based analysis. Montmarquette, Mahseredjian, & Houle (2001) find that class size of compulsory fist-year courses affect a student's probability of dropout in a non-linear manner. Given teacher experience, the authors find that class sizes in excess of 87 students increase the probability of dropout, while smaller classes have a positive impact on persistence.

A major shortcoming of previous literature is that students are observed at two points in time only, usually at initial enrolment and after one term (semester) or one year. Other studies suffer from small sample size and too short time periods (Stratton, O'Toole and Wetzel, 2008). The body of literature employing survival analysis is small but growing. Scott and Kennedy (2005) laid the foundation for discrete-time event history analysis. Motivated to understand pathway effects of educational attainment, the authors set up the competing risks model to evaluate drop out and degree attainment. Murray (2014) is one of the first South African authors to investigate the factors affecting graduation and dropout using a competing risks framework, focusing on credit points to graduation as the dependent variable of the analysis. The author argues that this approach circumvents the stopout phenomena discussed above. Using a sample of students from the University of KwaZulu-Natal (KZN) in South Africa, the author finds that residence and financial aid status are important determinants for both dropout and graduation. The receipt of financial aid and residence-based accommodation significantly assist students to graduate. The author also finds significant differences by race. White females graduate at quicker rates relative to African males as White females repeat fewer courses (Murray, 2014).

While the analysis in this paper does not include foreign students, empirical evidence regarding students' nationalities is mixed. Arias Ortiz and Dehon (2011) study dropout and degree completion also using discrete-time methods for competing risks survival analysis. They find that foreign students are more likely to experience consecutive enrolments without completing degree requirements. Living away from home without the necessary support, foreign students have a more difficult time integrating into academic environments. Having a mother with a higher education qualification contributes significantly to reducing the risk of dropping out while significantly increasing the chance of graduation. Not surprisingly, having a strong mathematical background reduces significantly the risk of dropping out during the first few years of study. Importantly a strong mathematical background increases significantly the chance of graduating in minimum time.

Papers such as Tinto (1975) and Murray (2014) clearly distinguish between voluntary and involuntary withdrawal. Voluntary withdrawal is dropout initiated by the student. Reasons for this may include early poor performance before any major exams are written, external factors such as family or financial issues or realising

they may have registered for an unsuitable or incompatible degree. Involuntary withdrawal focuses on the discontinuation of academic studies due to academic exclusion. This may include failing the same course numerous times or not meeting annual progression requirements for degree or study choices. It is important to note these distinctions as the quality of education in developing economies is suggestive of poorer academic preparation for higher education, thereby potentially leading to higher levels of dropout driven by poor academic performance leading to involuntary academic exclusion (Clerici et al., 2014).

3. METHODOLOGY

Survival analysis, also known as event history or hazard modelling, is often used to estimate the timing of events or longitudinal outcomes. Originally used in medical research by biostatisticians (Cox, 1972), survival analysis has been extended to social science research including economics, political studies and education. Initially when applied to economics of education studies, individual outcomes (for example dropout or graduation) for students were investigated using 'single-risk' models. Survival models are constructed to measure the probability of transition between two outcomes (Douglas, 1998). In most instances there are usually only two possible outcomes, e.g. employed and unemployed, smoking and non-smoking, etc.

In certain situations more than two outcomes are possible. Standard 'single-risk' models do not take into account the potential interdependence between competing outcomes (for example, dropout, stop out [2] and graduation). A method known as 'competing-risks' is preferred when there are more than two possible outcomes (Singer and Willett, 1993). Many outcomes are mutually exclusive (non-overlapping) and should cover all states. In terms of this analysis the outcomes are defined as drop out that is voluntary, drop out that is involuntary and graduation. Competing-risk models are preferred to single-risk models when multiple outcomes are possible. Although the latter may still be used it will result in misspecification due to correlation between events (DesJardins, Ahlburg and McCall, 2002).

As we are interested in multiple competing outcomes or risks, a competing-risks model to evaluate the hazard for events simultaneously is appropriate (Allison, 1984; Scott and Kennedy, 2005). One key advantage of this method is that we can not only investigate *whether* individuals are likely to drop out but also *when* they are

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[2] Stop out is defined as the non-continuous enrolment of students.

most likely to do so. Some type of models also allow for the relative risk of different groups over time to event to be established, again an advantage over more static methods.

Data using survival analysis techniques are separated into discrete and continuous-time data. Continuous time data requires that subjects are tracked very as often as possible, potentially on a daily basis. As suggested by Allison (1984), where time is measured in discrete units the use of discrete-time methods is more appropriate. Discrete time data usually includes education-type data as students are observed at most twice per year (at the end of each semester), but usually only once per year. In the educational literature it is better to use discrete-time methods rather than continuous time methods. As one does not observe the exact timing of dropout or other academic experiences (other than graduation) it is best to use competing-risks discrete-time methods as one does not need to know the exact timing of events other than the event occurring.

A common issue arising in survival analysis is that of censoring. Data is censored when the outcome of interest is not observed. Data may be right or left censored. Left censored data occurs when the starting point for individuals in the sample is not known. Right censored data is observed when the outcome or events of interest have not yet occurred for some individuals in the sample. In our case, individuals would be considered right censored; they are still in the system and have not dropped out nor graduated from the university. Survival analysis methods take account of this type of data censorship, thus yielding unbiased results.

The key to understanding competing outcomes is to understand the nature of the distribution of outcomes and in particular, the correlation between possible outcomes in this framework (Cleves et al, 2010). If the two potential outcomes are uncorrelated then standard survival analysis may be applied to the problem as future events are treated as censored data observations. However, dropping out from university is not uncorrelated with successfully completing academic studies as only one of the two events can take place first. As the outcomes of interest are correlated (even imperfectly), we proceed with the competing risks framework.

4. DATA

The data for this chapter comes from the University of Cape Town (UCT) Institutional Planning Department (IPD). Detailed data on undergraduate students who first enrolled at UCT between 2006 and 2008 was obtained for analysis. All applicants to the University are required to submit basic demographic information, secondary schooling details, degree choices, financial aid and housing requests. Applicants are not required to divulge family background information or any other personal background information. Thus information relating

to applicants' parents such as income, educational and occupational background are not routinely requested nor available. The final sample includes all students who enrolled for a three or four year degree and was a first time entering (FU) student. This is standard practice in South Africa when assessing students in the higher education sector. The IPD information provides detailed information for each student based on application, enrolment and progression, including grade point average (GPA) by year, field of study by faculty, degree programme and background information including high school attended and matric scores.

Apart from data on academic standing at the end of each academic year, student records also contain data on student secondary school such as type of secondary school and results from the final matric examination. Some data on personal characteristics such as gender, age at first enrolment, residence and financial aid status are also known.

5.   DESCRIPTIVE AND SUMMARY STATISTICS

Table 1 presents basic summary statistics for the sample. The data consists of 7891 observations of South African students enrolled at the university between 2006 and 2008. The sample is restricted to individuals who attended South African high schools and who wrote the same examinations as the public schools. The overall sample is 50% male while the Coloured intake is significantly more female compared to the other race groups. More than 69% of the cohort speak English as a home language, while significantly fewer African students at 13% have English as a first language. The racial breakdown reveals that White students make of 46% of the sample, followed by African, Coloured and Indian. More than half of students register for a three-year degree, with the majority of students registering in the Commerce and Humanities faculties. The Science and Engineering faculties make a smaller proportion of the sample. Approximately 14% of students receive financial aid while 28% of the sample live in a university residence. These descriptive statistics compare favourably with the University as a whole.

Table 1: Summary statistics for full sample

		Full Sample
Gender	*(Male)*	0.50
Race	*African*	0.26
	Coloured	0.18
	Indian	0.08
	White	0.46
3-year degree		0.58
Faculty	*Commerce*	0.32
	Engineering	0.19
	Humanities	0.31
	Science	0.16
English Home Lang		0.69
Financial Aid		0.14
Residence		0.28
2006		0.32
2007		0.33
2008		0.35
# Observations		7891

Among the variables used in the analysis include controls for gender, race, matric score, faculty of first enrolment, degree type, first-year GPA, financial aid status, residence status, number of course failed in the first year, home province and high school type. As the university does not collect socioeconomic information from applicants, we do not have information about parental education or household income levels. Gender is a binary variable with the reference group set to male. The race variable is comprised of a set of four binary variables. These include African/Black, Coloured, Indian and White. White is used as the reference group. High school type is divided into public and private schools. Public schools are set as the base category. Within the public schooling system, schools are assigned a quintile indicating the poverty level of the school and its surrounds. Dummy variables are assigned for the five quintiles, with quintile 5 schools as the omitted category.

For this chapter, the student's first-year GPA was used to create a set of dummies to examine its effect on dropout and graduation. These dummies coincide with the subject's class ranking as it is easier to measure the relative risks of dropout and graduation with dummy variables rather than using first-year GPA as a continuous variable. It is also hypothesised that GPA is non-linearly related to the probability of dropout, therefore a dummy variable specification allows for better testing of this scenario (Ishitani and DesJardins, 2002). Students' whose GPA was between 0% and 49% is used as the reference category.

To indicate a student's home faculty we construct dummy variables for each of the faculties included in the study. Due to the nature of application and entry to the Health Sciences faculty these students are excluded from the study. The reference category is the Commerce faculty. Two time-dependent explanatory variables, residence status and financial aid status, were also included in the analysis. Institutional data only capture these variables for the first year, thus we are unable to assess the impact of financial aid over the course of a student's academic career, only during the first year. Similarly, we also have residence status for the first year only. Again we are limited in our interpretation of the impact of staying in a university residence as we do not have information for each year the student was actively enrolled.

6. RESULTS

The results for the analysis is presented in Table 2. Each column in the table displays the sub-distribution hazard ratio or SHR for the variable concerned. Column 2 displays the SHR results when involuntary academic exclusion and graduation are treated as censored in the data. SHR's may be interpreted as a rise in the incidence of the outcome variable for an increase in the independent variable when the SHR value is greater than one. If the SHR value is between zero and one then the interpretation becomes a lower incidence of the outcome variable for a given value of the independent variable.

Table 2: Sub-distribution hazard ratios (SHR) estimates by academic outcome

| | Dependent Variable | | | | | |
| | Voluntary Dropout | | Involuntary Dropout | | Graduation | |
	SHR	Std. Error	SHR	Std. Error	SHR	Std. Error
Male	0.8465293**	0.06240	1.636451***	0.09373	0.8504755***	0.01780
Black	0.5205629***	0.07426	2.045234***	0.23477	0.8154361***	0.03560
Coloured	0.6356768***	0.06936	2.148319***	0.21364	0.855926***	0.02691
Indian	0.8511589	0.11572	1.98278***	0.23457	0.8264333***	0.03024
Private school	0.8891803	0.07464	0.9791955	0.07091	1.006572	0.02391
Quintile 1	0.4900724	0.29032	1.194713	0.20432	0.7994241	0.12393
Quintile 2	0.9237966	0.36363	0.9880181	0.16526	0.9538184	0.09730
Quintile 3	0.7004949	0.18366	1.234112**	0.11957	0.8592024**	0.05265
Quintile 4	0.9857714	0.21950	1.344833**	0.14391	03.8481065**	0.05488
Matric score	0.9844617***	0.00351	0.9899693***	0.00303	1.004095**	0.00149
3-yr degree	1.055906	0.10906	0.8267607**	0.06988	1.488158***	0.04215
Humanities	1.5514341***	0.17132	0.9385217	0.09149	0.9478539	0.03051
Science	0.8169074	0.12109	1.577755***	0.15166	0.9090952**	0.03626
Engineering	0.9351712	0.10881	1.524217***	0.10907	1.011679	0.02762
Financial Aid	0.7197374***	0.09222	1.170158**	0.07757	0.9123766***	0.03172
Residence	1.347826***	0.12471	1.611731***	0.09928	0.8951009***	0.02491
Extended prog	0.9154941	0.10549	1.386944***	0.08386	0.7291766***	0.02663
English HL	0.8848865	0.10642	0.694378***	0.06812	1.169799***	0.04332
GPA50-59	0.5513161***	0.04681	0.2673748***	0.01571	2.750726***	0.11547
GPA60-69	0.2854101***	0.02854	0.094726***	0.00908	3.922141***	0.16210
GPA70-74	0.1655899***	0.03171	0.0354091***	0.01017	4.497768***	0.21038
GPA75+	0.1573749***	0.03724	0.0202048***	0.00895	4.290477***	0.21112
Time dummies	Yes		Yes		Yes	

As expected, individuals with higher entry scores are slower to voluntarily exit the system. This is similar to findings by Murray (2014) where a comparable pattern of exit is found to exist. In this context, South African higher education is similar to that of other developed economies where dropout is not necessarily driven solely by prior academic achievement. Male students are slower to dropout compared to female students. Surprisingly African and Coloured students dropout at slower rates when compared to White students, while Indian students are indistinguishable from white students where voluntary dropout is concerned. Students registered in the Humanities faculty voluntarily dropout faster (or sooner) than students from any other faculty. This could be due to many students who enter the Humanities faculty as a second choice entry rather than their first choice of degree, thus leading to students being undecided about a future within the Humanities faculty.

Students who receive financial aid are slower to voluntarily dropout. As one would expect, the financial assistance provided to students in the form of financial aid helps students to overcome voluntary dropout much easier than students funded from other sources. In contrast, students who live in university residence voluntarily dropout much faster than students who either live on their own or still with the families.

Finally, the higher the student's GPA in the first year, the less likely and more slowly they are to exit the system. Some courses or programmes require students to meet certain progression requirements and part of this effect is possibly captured in the GPA effect.

Colum 4 presents the results when academic exclusion is not voluntary. We find a similar pattern for race and gender. Male students are more likely to be excluded from the institution at earlier stages in their studies compared to females. African, Coloured and Indian students are significantly more likely to be excluded earlier during their studies, possible reflecting the struggle to adjust to the level of academic studies due to past educational exposure and experience. Science and Engineering students are significantly more likely to be excluded earlier during their studies compared to Commerce students. There are two perspectives indicated here. First, the Commerce faculty is more likely to attract students with higher matric grades due its popularity amongst entering students. Second, there is great concern in South Africa about the quality of high school physics and mathematics as the lack of exposure to proper teaching techniques and subject matter greatly influences students' chances of succeeding in these fields post-secondary school. As is expected, the higher the GPA in the first year, the less likely a student is to be excluded from the university due to poor academic performance. Home language has been shown to be an important indicator of success in higher education. We find that students whose home language is English are less likely to be academically excluded relative to any other home language group.

An interesting result is that of students on extended programmes. Recent research shows that these students are not more likely to graduate relative to main stream students. Smith et al (2014) found that the interventions of the extended programme did not have a statistically significant effect on graduation rates for students enrolled in Commerce, Science and Engineering programmes at UCT. An interesting outcome is the impact of school-type. Students who attended quintile 3 and 4 high schools are more likely to be academically excluded earlier during their studies relative to students who attended quintile 5 high schools. This is an unlikely outcome as one would expect quintile 1 and 2 students experience higher incidences of involuntary exclusion. In contrast to voluntary exit, students receiving financial aid are more likely to be academically excluded earlier during their studies compared to students who receive other sources of financing. Students in residence also experience greater rates of academic exclusion earlier during their studies.

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Column six presents the results when graduation is set as the subject of interest and voluntary and involuntary dropout are set as the censored outcomes. Race and gender again indicate that individuals who are male, African, Coloured and Indian graduate at slower rates relative to female and White students respectively. In line with previous research (Smith, et al., 2014) a higher matric entry score is indicative of higher graduation rates. Students in residence, recipients of financial aid and those registered for extended programmes graduate at rates slower than those who do not participate in the above-mentioned activities. As evidenced in previous studies for South Africa, individuals with English as the home language graduate at faster hazards than those who do not speak English. Lastly, not surprisingly, a higher first year GPA signifies statistically higher graduation rates compared to those with a first year GPA of less than fifty percent.

A disappointing outcome of the first set of regressions is that the type of high school a student attended is shown to be insignificant in determining the probability of dropout and graduation. With this in mind, we ran another sets of estimations by coding high schools according to the old authority of schools in South Africa. Previous studies by Smith (2012) and Smith, Case and Van Walbeek (2014) find significant effects for students who attended schools previously classified as DET (schools for African learners).

7. CONCLUSION

This paper focusses on the analysis of academic outcomes for the University of Cape Town. We identified that an understanding of the temporal element of education paths is important for understanding different academic outcomes students may experience in a higher education setting. To this end, we applied discrete-time methods for competing risks events history analysis. The results indicate that race and gender are consistently important determinants across all three potential academic outcomes. Higher entrance scores given by students' performance on the final matric exam are associated with lower probabilities of either kind of dropout and higher probabilities of graduation. Students who receive financial aid have lower probabilities of voluntary exclusion but higher probabilities of involuntary exclusion. These students also have lower rates of graduation relative to students with other sources of funding. Students' residence status is another important factor determining academic outcomes. Residential status is associated with higher rates of voluntary and involuntary dropout and lower rates of graduation. Lastly, students' academic performance in first year, given by their GPA for the first year. A GPA of at least 50% is associated with lower rates of voluntary and involuntary dropout and higher rates of graduation, but the effect varies across the grade distribution as one would expect. The outcomes for individuals

registered on academic programmes are of concern too. Students on academic programmes are more likely to involuntarily excluded and less likely to graduate compared to mainstream students. This is cause for concern as this programme is an initiative to address transformation in higher education, attracting significant resources from within and outside the university.

A lack of detailed information about individuals enrolled in higher education such as parental background and socio-economic status prevents a more detailed analysis of determinants of higher education academic outcomes. Previous studies, both local and international have shown that parental education and family background are important determinants of academic performance.

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