

Higher Education Institutions and Graduate Labour Market Outcomes in South Africa

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(Preliminary draft. Please do not quote)

Abstract

The emerging consensus regarding high and rising levels of graduate unemployment in South Africa in recent years has primarily been based on a select number of studies, all of which have serious shortcomings ranging from deficient definitions of “graduates” to the use of outdated, incomplete, or unrepresentative data. Moreover, given the heterogeneity in the quality of higher education in South Africa, existing findings regarding aggregate graduate unemployment in the country, even if accurate, mask the substantial variation in labour market outcomes which are likely to be faced by graduates from different higher education institutions. This paper attempts to address these issues by examining graduate unemployment and employment in South Africa with specific emphasis on the type and quality of higher education using multiple labour force survey and administrative datasets. Its primary contribution is to incorporate the effect of potential measures of higher education institution type and quality on the likelihood of graduate unemployment and employment by probabilistically linking graduates that are observed in labour force survey data to the institutions from which they are likely to have graduated given their time-invariant observable characteristics and the known demographic composition of the graduates produced by each of South Africa’s formal higher education institutions every year.

The analysis shows that graduate unemployment in South Africa is not only low in relation to overall unemployment in the country, but that much of the racially-delineated differentials in graduate unemployment and employment outcomes can likely be attributed to heterogeneity in the quality and type of higher education institutions commonly attended by individuals from different racial backgrounds.

List of Abbreviations

CESM	Classification of Educational Subject Matter
CHET	Centre for Higher Education Transformation
DoE	Department of Education
FET	Further Education and Training
FTE	Full-Time Equivalent
HAI	Historically Advantaged Institution
HDI	Historically Disadvantaged Institution
HE	Higher Education
HEI	Higher Education Institution
HEMIS	Higher Education Management Information System
HEQF	Higher Education Qualification Framework
HSRC	Human Sciences Research Council
LFP	Labour Force Participation
LFS	Labour Force Survey
NQF	National Qualifications Framework
QLFS	Quarterly Labour Force Survey
SAQA	South African Qualifications Authority
StatsSA	Statistics South Africa

Introduction

Research increasingly suggests that the relative labour market benefits of HE in South Africa may be declining rapidly. The apparent significant rise in unemployment rates among South Africa's stock of graduates between 1995 and 2005 and the extent of the emerging skills-mismatch according to which the skills that new graduate labour market entrants possess are increasingly misaligned with the skills that employers demand, are two areas that have received much attention both in academic research and the media (Koen, 2006; Branson *et al.*, 2009b, p. 2). It is generally argued that South Africa's skills-mismatch has largely been the result of the HE system's lack of responsiveness to structural changes in the domestic economy since 1994 in conjunction with changes in the underlying demographic composition of South Africa's pool of graduate labour force participants and the fields in which they chose to study (Bhorat, 2004; DRPU, 2006; Pauw *et al.*, 2008). In a review of the South African literature on unemployment among those with post-secondary qualifications, (Kraak, 2010) concludes that this skills-mismatch has exacerbated South Africa's existing skills shortages and adversely impacted on the employability and subsequent labour market prospects of tertiary-educated individuals more so than for any other education cohort.

Despite increasingly frequent references in the media and political statements to worsening labour market outcomes for South African graduates, the shortcomings of existing research on the relationship between HE and the labour market imply that there is still much confusion about the labour market prospects which graduates are likely to face. This confusion is exacerbated by frequent public reporting of employment and unemployment figures for graduates that are outdated, unverified or taken out of context. Furthermore, it is still not well-understood why there appear to be persistent differences in the labour market outcomes faced by graduates from different race groups, or how the type and quality of the higher education institutions (HEIs) attended impacts on graduates' expected labour market outcomes.

This paper aims to provide answers to some hitherto unanswered questions regarding graduate labour market outcomes by examining the relationship between HEIs and the probability of unemployment and employment in the South African labour market. By focussing on both the probability of employment and unemployment, the research aims to first assess the scale and scope of South Africa's apparent graduate unemployment problem in the context of other developments that have affected the domestic labour market and the HE system over time. The objective of the multivariate analysis is to not only estimate the magnitude of the labour market premiums associated with participation in HE in terms of lowering the likelihood of unemployment and raising the likelihood of employment in South Africa, but to incorporate the impact of HE institutional type and quality on employment and unemployment outcomes by probabilistically linking graduates to the known distributions of graduates produced by South Africa's HEIs each year, based on time-invariant demographic characteristics.

The results from the analysis reveal that graduate unemployment in South Africa is not rising significantly over time and that it is, in fact, low in relation to overall unemployment in the country. Given the significant changes that have occurred in South Africa's HE system over the past 25 years, the results from the multivariate analysis show that much of the unexplained differences in employment and unemployment rates between Black, Coloured, Indian, and White graduates may be attributed to differences in the type and quality of HEIs that different race groups have historically been likely to attend.

These findings suggest that graduate unemployment in the country is certainly not a general problem and that interventions aimed at improving the employment prospects of historically disadvantaged graduates should be targeted at improving the functionality of historically disadvantaged HEIs, rather than entailing wide-scale reform of South Africa's HE system as a whole.

1 The Literature on Graduate Unemployment and Employment in South Africa

Despite the limited attention that has historically been given to graduate labour market outcomes and their potential implications in the context of South Africa's broader labour market challenges, a number of prominent studies released since 2000 have raised concerns that graduate unemployment may rapidly be emerging as a significant problem in the country. In one of the earliest of these studies, Bhorat (2004), using data from the 1995 October Household Survey (OHS) and March 2002 Labour Force Survey (LFS), finds that, amidst rising overall unemployment rates, the broad unemployment rate for tertiary-educated individuals increased by 139% between 1995 and 2002 – by far the largest increase in unemployment for any education cohort. More worrying, however, is the fact that these rises in unemployment rates appeared to have been greatest for individuals with degrees and post-graduate qualifications, with White and Black graduate broad unemployment rates rising by 141% and 280%, respectively, over the 7-year period (Bhorat, 2004, p. 959).

Bhorat (2004)'s substantive findings have received support in a number of papers published since 2004. Notable among these are the studies by DRPU (2006) and later Pauw *et al.* (2008) and Kraak (2010). The results from the descriptive analysis by DRPU (2006) showed that the increase in broad unemployment rates for tertiary-educated individuals from 6.6% in 1995 to 9.7% in 2005 was the largest for all education groups, despite levels of tertiary unemployment remaining low in relative terms (DRPU, 2006, p. 8). The DRPU report also showed that graduate employment and unemployment rates varied substantially across race groups, suggesting that higher levels of unemployment among Black graduates, in particular, could at least partly be ascribed to the poor quality (or the perceived poor quality in the eyes of employers) of many HEIs in conjunction with the poor performance of the majority of the historically disadvantaged formal schooling system (DRPU, 2006, p. 18-20). In other words, the extent of heterogeneity in the quality of HEIs may have eroded employer confidence in the productivity-signalling effect of HE qualifications, resulting in a shift in demand towards more experienced rather than more qualified employees (DRPU, 2006, p. 21).

The finding that the employability of South Africa's HE-educated individuals, when measured in terms of the probability of being employed rather than unemployed, varies substantially by race has been emphasised in a large number of papers¹, most of which have relied on descriptive analyses and the use of nationally representative labour force data sources to draw inferences about changes in the employment and unemployment patterns for tertiary-educated individuals over time. More recent studies have also sought to identify the impact that HE institutional type and quality have on graduate employment and

¹ See Maharasoa and Hay (2001); Mlatsheni and Rospabe (2002); Kruss (2004); Koen (2006); Pauw *et al.* (2008); Branson *et al.* (2009a); Kraak (2010); Moleke (2010); Fisher and Scott (2011) and Bhorat *et al.* (2012), among others.

unemployment probabilities. Using data on seven South African universities from the Human Sciences Research Council's (HSRC) Graduate Destination Study, Bhorat *et al.* (2012) find that graduates who attended historically disadvantaged institutions (HDI) have significantly poorer labour market prospects than graduates from historically advantaged institutions (HAI), both in terms of initial absorption into employment and the ultimate incidence of unemployment. Similarly, Branson *et al.* (2009a) use data from the Cape Area Panel Study (CAPS) and find that the type of HEI at which individuals in the Western Cape province complete their tertiary studies has a significant impact on the labour market outcomes which they subsequently face.

1.1 Criticisms of the Existing Literature on Graduate Employment and Unemployment in South Africa

The substantive conclusions drawn from studies noting adverse changes in the labour market prospects faced by graduates in South Africa resonate with those from international studies which have suggested that structural changes in other labour markets have led to a global trend of worsening labour market prospects for those with HE qualifications (Teichler, 2007; Nunez and Livanos, 2010; Wu, 2011; Hum-burg *et al.*, 2012). Consequently, the nature of the link between participation in HE and expected labour market outcomes is increasingly coming under question, both in South Africa and abroad. However, most of the studies that have been conducted for the domestic labour market have serious deficiencies which make their findings subject to a number of caveats.

First, few studies adequately differentiate between individuals with university degrees (hereafter referred to as *graduates*) and individuals with post-secondary certificates and/or diplomas (hereafter referred to as *diplomates*) when analysing and drawing conclusions about the labour market prospects of the tertiary-educated (hereafter collectively referred to as *tertiaries*), despite the fact that the two groups have been shown to differ vastly in terms of expected labour market outcomes (Koen, 2006, p. 21). As will be shown in Section 2 below, this leads to a significant upward-biased perception of graduate unemployment and worsening graduate labour market prospects in the country.

Second, most of the studies draw causal inferences about the relationship between HE and labour market outcomes and strong conclusions about aggregate trends in the labour market outcomes for tertiaryaries from descriptive analyses conducted on data which was either not representative (Branson *et al.*, 2009a; Bhorat *et al.*, 2012), incomplete (Bhorat, 2004; DRPU, 2006; Pauw *et al.*, 2008), or dated (Pauw *et al.*, 2008; Kraak, 2010). Moreover, according to Yu (2008, 2010), there is good reason to doubt the accuracy of labour market outcome information for the tertiary-educated in the 1995 October Household Survey - the dataset which many of the most prominent studies of tertiary labour market outcomes in South Africa use as the reference point for their empirical analyses.

Third, virtually none of the studies reviewed emphasise the levels of uncertainty that underlie their empirical methodologies and the confidence intervals which surround their reported point estimates, despite the fact that the sample sizes on which those estimates are based are often very small and that confidence intervals are therefore likely to be large. Consequently, few of the studies attempt to establish the

statistical significance of the differences between relevant point estimates when drawing conclusions regarding the trends in, and levels of, labour market outcomes for graduates. Instead, the significance of such “trends” appear to be inferred simply by comparing the inter-temporal changes in labour market outcome point estimates for individuals with HE qualifications with those for other education cohorts.

Finally, with the exception of more recent studies like those by Branson *et al.* (2009a), Moleke (2010) and Borat *et al.* (2012), limited attention has thus far been given to the importance of heterogeneous HE institutional quality and historical patterns of access to HE institutions in explaining race-based labour market outcome differentials in South Africa, despite the fact that most studies find substantial differences in the labour market prospects for Black and White tertiaries. Moreover, despite Borat *et al.* (2012)’s recent exploratory efforts to ascertain the impact of HEI quality on labour market outcomes using the uniquely detailed, but inherently unrepresentative HSRC Graduate Destination data, little is known about the extent to which institutional considerations shape the labour market prospects of South African graduates. Yet in order to understand the nature of racial labour market outcome differentials and the potential causal mechanisms that drive them, it is necessary to take changes in South Africa’s HE landscape and the demographic composition of its stock of graduates over time into account.

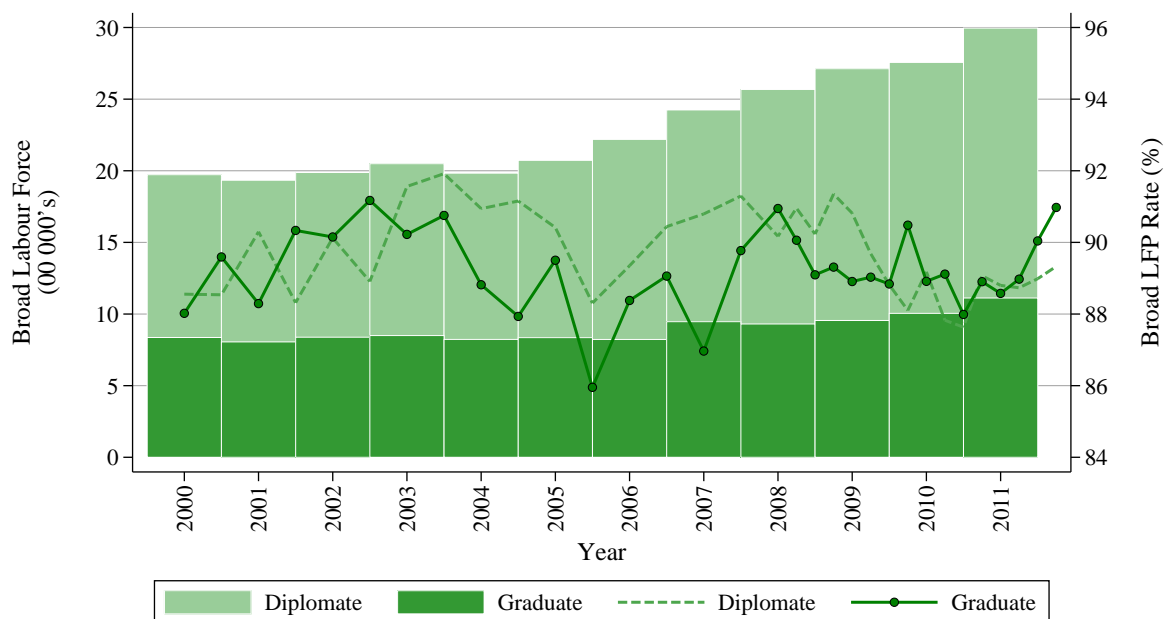
2 The South African Graduate Labour Market

To understand the pitfalls of analysing the labour market outcomes for all tertiary-educated individuals as though they constitute an homogeneous group of individuals and referring to them as “graduates”, it is necessary to illustrate the marked differences in labour market status outcomes for those individuals with diplomas and/or certificates from either FET colleges or HEIs and individuals with university degrees or higher obtained exclusively from HEIs. The former group is hereafter collectively referred to as *diplomates* and comprises all HE- or FET-educated individuals with National Qualification Framework (NQF) exit level 5 or 6 qualifications. By contrast, the latter group is hereafter collectively referred to as *graduates*, comprising all HE-educated individuals with NQF exit level 7 or higher qualifications. The breakdown of the types of qualifications that are currently and have historically been awarded by South Africa’s HEI along with their associated NQF exit level classifications is presented in Table A.1 in Appendix A.

Figure 2.1 shows the sizes of the narrow labour force and magnitudes of the narrow LFP rates for graduates and *diplomates* over the period 2000 - 2011.² Other than the fact that *diplomates* represent a larger share of the tertiary-educated labour force than graduates, the two groups appear to have remarkable similar narrow LFP rates. However, the dissimilarities between these two groups become evident when looking at their respective employment rates as presented in Figure 2.2. While *diplomates* still have a larger share of employment among the tertiary-educated than graduates, the graduate employment rate has consistently been between 5 and 10 percentage points higher than the *diplomate* employment rate over the period under consideration. The differences between the two tertiary-educated groups become even clearer when looking at narrow unemployment and narrow unemployment rates over the period.

² With only a few exceptions, the narrow definition of the labour force is used throughout this paper given that it is the most consistent definition used across the various survey datasets used in the descriptive and multivariate analysis.

Figure 2.1: Narrow LFP and LFP rates for *Graduates* and *Diplomates* (2000 - 2011)



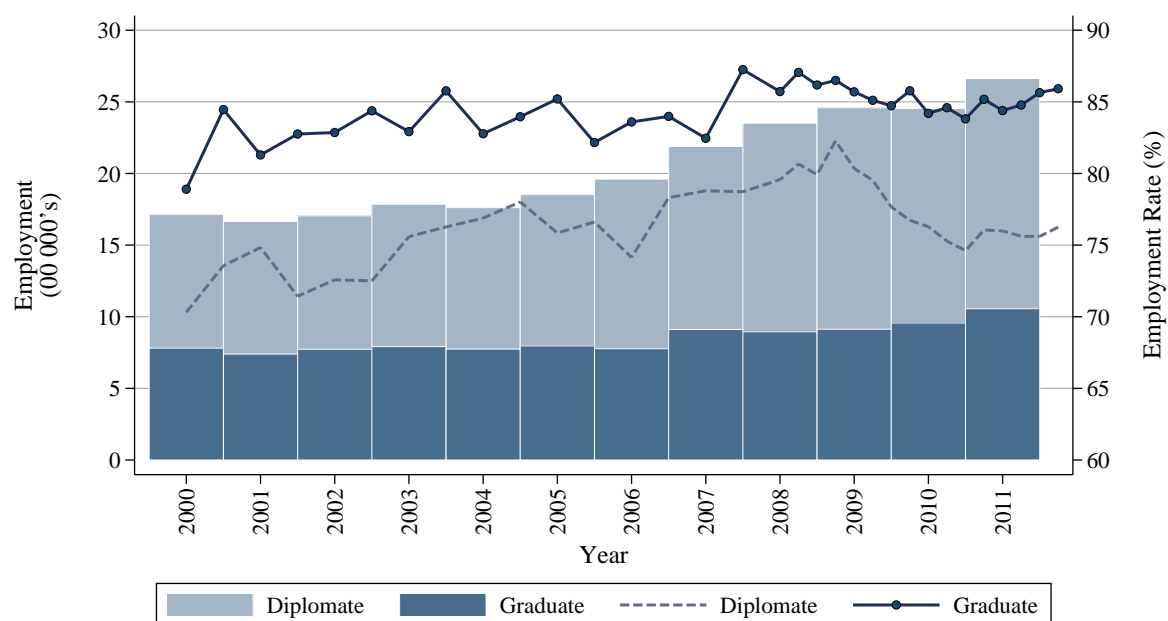
Source: Own calculations using March 2000 LFS - QLFS2011Q4. NOTES: Estimates are weighted and are calculated only for graduates and *dipolomates* in the population of working-age (15 - 65 year-olds). *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

Figure 2.3 shows that *diplomates* dominate narrow unemployment among the tertiary-educated. In fact, by 2011, more than 200 000 of the just over 250 000 narrowly-unemployed tertiary-educated held *diplo-mate*-level qualifications. By contrast, not once since 2000 have graduates constituted more than 27% of the tertiary-educated narrowly unemployed. Instead, the narrow unemployment rate for graduates has consistently been 5 or more percentage points lower than the narrow unemployment rate for *diplomates*.

These figures offer a simple but compelling argument against the misguided practice of drawing inferences about the labour market outcomes faced by university graduates and degree-holders from the analysis of the labour force outcomes faced by tertiary-educated individuals as a whole. Doing so will clearly lead to upward-biased perceptions of graduate unemployment in the country. This is particularly poignant when one takes into account that most of the survey data on which analyses regarding employment and unemployment outcomes in South Africa are based do not enable one to distinguish between *diplomates* who obtained their qualifications from HEIs and *diplomates* who obtained their qualifications from FET colleges.³ Yet, it is not only known that FET diplomates constitute a significant proportion of all diplomates, but also that the quality of FET college diplomas and certificates are generally lower and, therefore, less likely to improve employment prospects and reduce the probability of unemployment, than HE diplomas and certificates (Financial and Fiscal Commission, 2012; Fisher and Scott, 2011). As such, there is a clear case to be made for analysing the labour market outcomes faced by university graduates separately from those faced by *diplomates* and to use the latter group only as a comparator

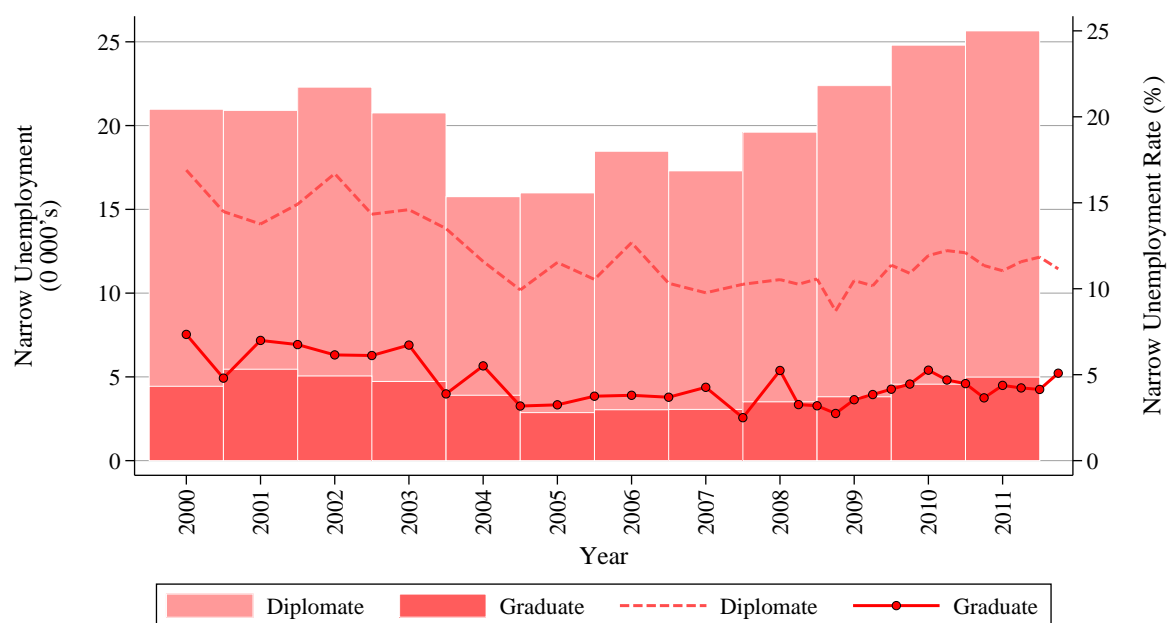
³ Unless explicitly stated otherwise, HE specifically refers only to South Africa's public higher education system which excludes FET colleges. Similarly, HEIs either refer to the 36 former technikons or general academic universities or the 17 present-day universities that constitute South Africa's public HE system. It follows that *HE-educated individuals* refer only to those individuals who have completed either a *diplo-mate* or *graduate*-level qualification at one of South Africa's HEIs.

Figure 2.2: Employment and Employment rates for *Graduates* and *Diplomates* (2000 - 2011)



Source: Own calculations using March 2000 LFS - QLFS2011Q4. NOTES: Estimates are weighted and are calculated only for graduates and *dipolomates* in the population of working-age (15 - 65 year-olds). *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

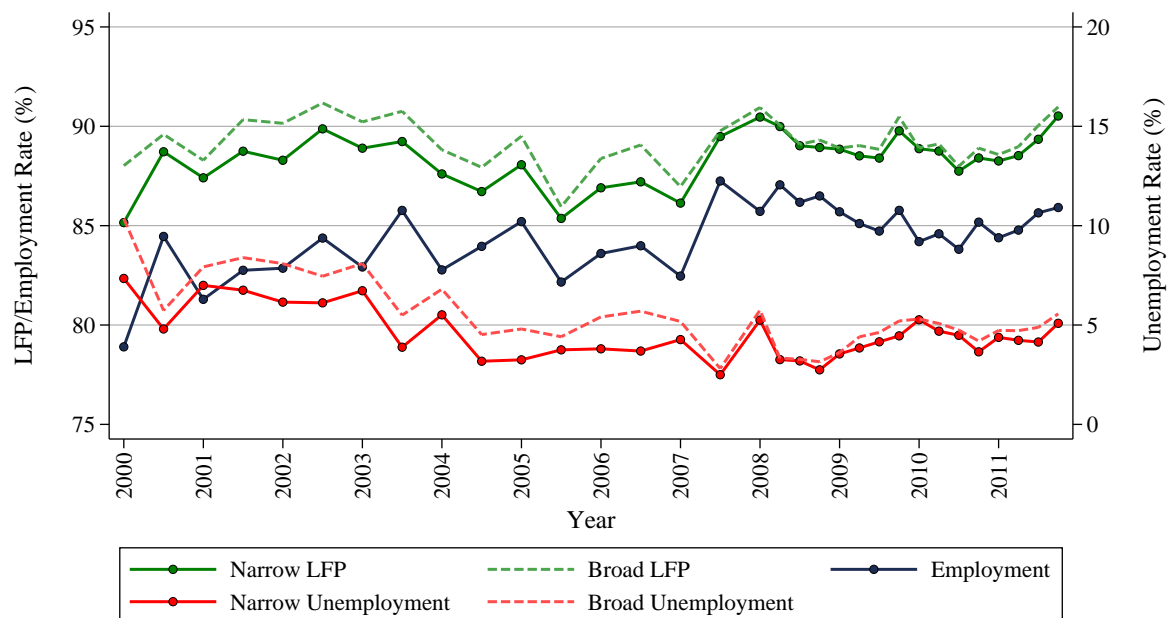
Figure 2.3: Narrow Unemployment and Unemployment rates for *Graduates* and *Diplomates* (2000 - 2011)



Source: Own calculations using March 2000 LFS - QLFS2011Q4. NOTES: Estimates are weighted and are calculated only for graduates and *dipolomates* in the population of working-age (15 - 65 year-olds). *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

group.

Figure 2.4: Broad/Narrow Graduate LFP, Employment, and Unemployment Rates (2000 - 2011)

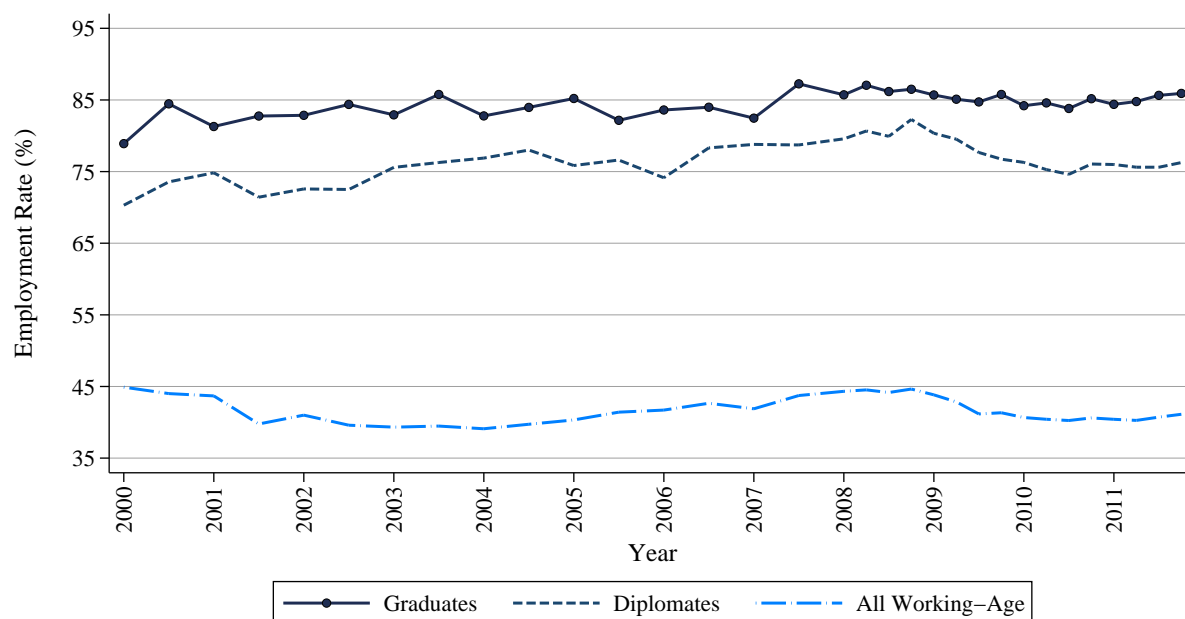


Source: Own calculations using March 2000 LFS - QLFS2011Q4. NOTES: Estimates are weighted and are calculated only for graduates in the population of working-age (15 - 65 year-olds). *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

Given that the analysis which follows is concerned with graduates only, Figure 2.4 presents the broad and narrow LFP, employment, and unemployment rates for graduates between 2000 and 2011. The distinction between the broad and narrow labour force often plagues studies concerned with unemployment. However, as can be seen from the graph, the difference between these two definitions of LFP and unemployment are effectively negligible for graduates. As such, it is largely irrelevant whether one analyses unemployment outcomes for graduates in South Africa using the broad or the narrow definition of the labour force. While graduate LFP rates have fluctuated slightly between 2000 and 2011, there is no clear evidence of a long-term upward or downward trend. By contrast, graduate employment rates appear to have risen over the period while graduate unemployment rates have fallen. However, the trends in these labour market status outcomes for graduates is of secondary concern. Of primary importance is the fact that graduate employment rates have consistently been higher than 80% since 2001 and that graduate unemployment rates have consistently either been lower than 5% or just above it since 2003. From this picture, it is thus tempting to conclude that graduate unemployment in South Africa is not only not alarmingly high, but that it is, in fact, rather low. However, in order to draw such a conclusion it is necessary to evaluate graduate employment and unemployment rates in the context of South Africa's overall employment and unemployment rates. Figures 2.5 and 2.6 do precisely this. It is clear from the graphs that South Africa's overall employment rate in the population of working-age is extremely low at only 45%. Similarly, the overall narrow unemployment rate in the population of working age of around 25% is extremely high.

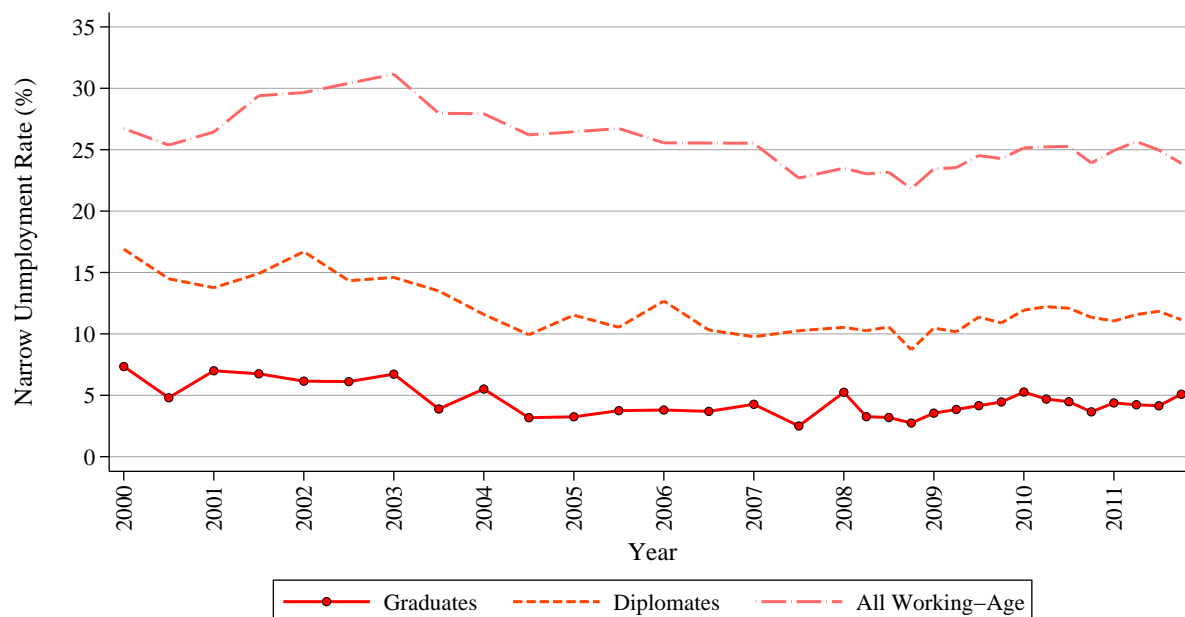
Within the context of South Africa's considerable overall unemployment rate and its low employment

Figure 2.5: Employment Rates for *Graduates*, *Diplomates*, and the Population of working-age (2000 - 2011)



Source: Own calculations using March 2000 LFS - QLFS2011Q4. NOTES: Estimates are weighted and are calculated only for graduates in the population of working-age (15 - 65 year-olds). *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

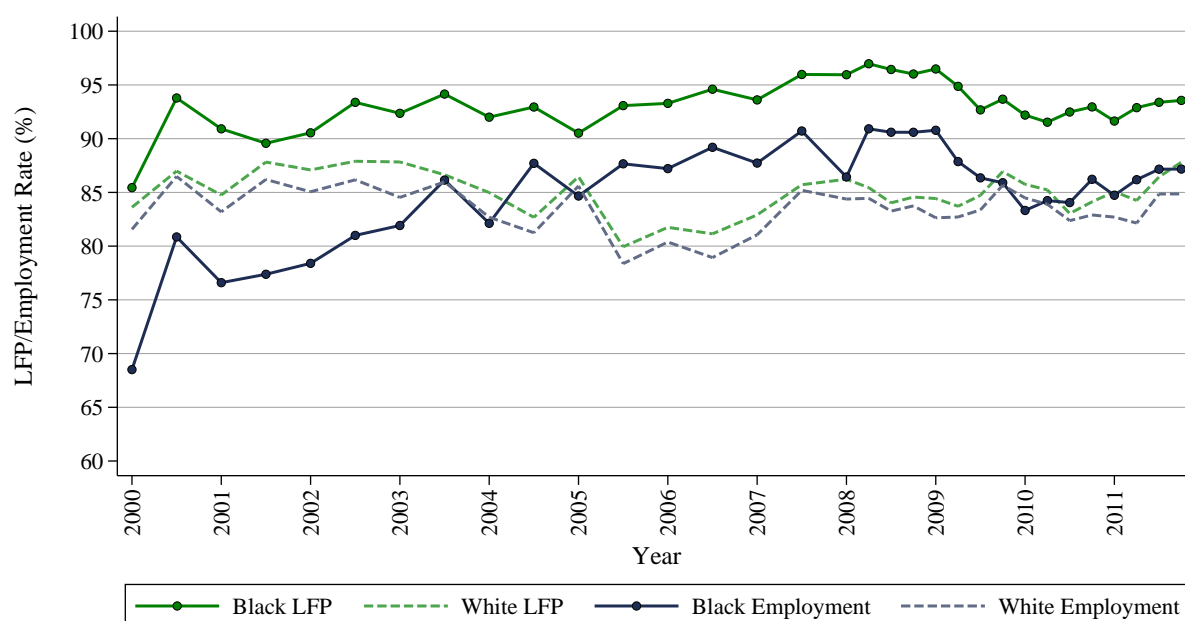
Figure 2.6: Narrow Unemployment Rates for *Graduates*, *Diplomates*, and the Population of working-age (2000 - 2011)



Source: Own calculations using March 2000 LFS - QLFS2011Q4. NOTES: Estimates are weighted and are calculated only for graduates in the population of working-age (15 - 65 year-olds). *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

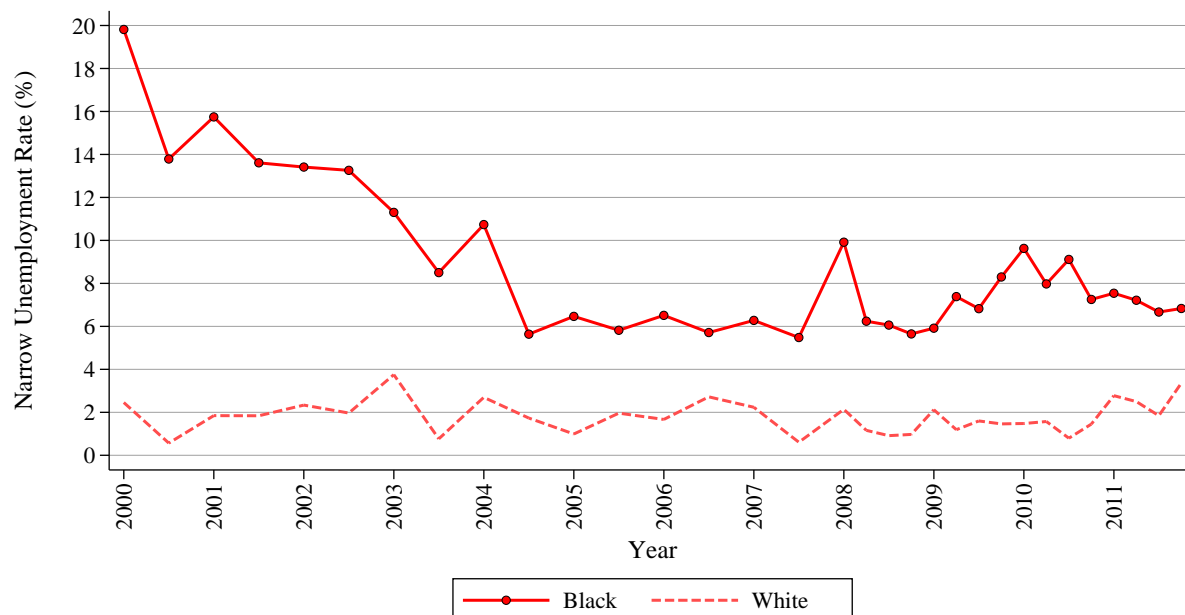
rate, it would be difficult to argue that graduate employment is low or that graduate unemployment is alarmingly high. Such assertions do not seem to have any basis in reality and are clearly not supported by the data. However, what the figures so far fail to reflect is the differences in graduate labour market status outcomes between race groups. Figure 2.7, for example, shows that while the narrow LFP and employment rates for White graduates track together very closely over time, there has been a far larger difference of around 5 percentage points between the narrow LFP rate and the employment rate for Black graduates since 2004. As a result, despite the fact that the employment rate for Black graduates has been at least as high as the employment rate for White graduates since 2003, the fact that Black graduates have a significantly higher narrow LFP rate than White graduates means that they will likely also have a significantly higher narrow unemployment rate. This is precisely what is shown in Figure 2.8. While the narrow unemployment rate for Black graduates has decreased considerably over time, from an estimated high of 20% in 2000 to just under 7% in 2011, it nevertheless remains almost twice as high as the unemployment rate for White graduates.

Figure 2.7: Narrow LFP and Employment Rates for Black and White *Graduates* (2000 - 2011)



Source: Own calculations using March 2000 LFS - QLFS2011Q4. NOTES: Estimates are weighted and are calculated only for graduates in the population of working-age (15 - 65 year-olds). *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

None of the findings in this section can be taken to suggest that graduate unemployment in South Africa is either alarmingly high, or is rising at an alarming rate. On the contrary, it appears as though graduate unemployment rates have been on a long-term downward trend since 2000 and are low in relation to overall unemployment in the country. Moreover, the gap between the unemployment rate for Black and White graduates has narrowed considerably between 2000 and 2005. Yet, the fact that such a gap still exists and that it does not appear to be narrowing after 2005 begs the question of what it is that distinguishes Black and White graduates, such that the former group is likely to face worse labour market outcomes than the latter group. More generally, it remains unclear why there are unexplained differences in the employment and unemployment outcomes for graduates from different race groups and how these

Figure 2.8: Narrow Unemployment Rates for Black and White *Graduates* (2000 - 2011)

Source: Own calculations using March 2000 LFS - QLFS2011Q4. NOTES: Estimates are weighted and are calculated only for graduates in the population of working-age (15 - 65 year-olds). *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

differences relate to HE institutional factors. The objective in the remainder of this paper is to provide answers to this question.

3 The South African Higher Education Landscape

Historical, South Africa's HE landscape is highly fragmented. Before 2004, the public HE system comprised a total of 36 HEIs which were divided into 15 technikons and 21 general academic universities. While technikons operated as *de facto* vocational training institutions, focussing primarily on the application of knowledge, universities concentrated on the development of knowledge and the training of students in such scientific and scholarly disciplines as would enable them to occupy high-level professions (Bunting, 2002, pp. 62 - 63). However, the HE system was not only fragmented in terms of function, but also in terms of governance, funding and, as a result, the quality of education provided by different parts of the system.

Under Apartheid, eight racially demarcated government departments were tasked with the administration of the 36 HEIs. Significant differences in the amount of funding and resources available to each department and the amount of developmental support they were therefore able to provide the various HEIs under their control, meant that this policy had the effect of further fragmenting the HE system into what can most accurately be described as historically disadvantaged, or Black, institutions (HDIs) and historically advantaged, or White, institutions (HAIs). The classification of each of South Africa's 36 former

HEIs as either historically disadvantaged or historically advantaged is shown in Table A.2. In total, 10 of the former universities and 7 of the former technikons can be regarded as historically disadvantaged.

Following South Africa's democratization in 1994, the HE landscape was subjected to a number of significant policy changes, chief among which was the amalgamation of its 36 technikons and universities into 11 traditional universities, 6 comprehensive universities, and 6 universities of technology.⁴ This amalgamation not only reduced the total number of public HEIs from 36 to the current 23 HEIs shown in Table A.3, but also meant that some technikons merged with general academic universities and, more importantly, that some HDIs merged with HAIs.⁵

3.1 Changes in HE Graduate Outputs

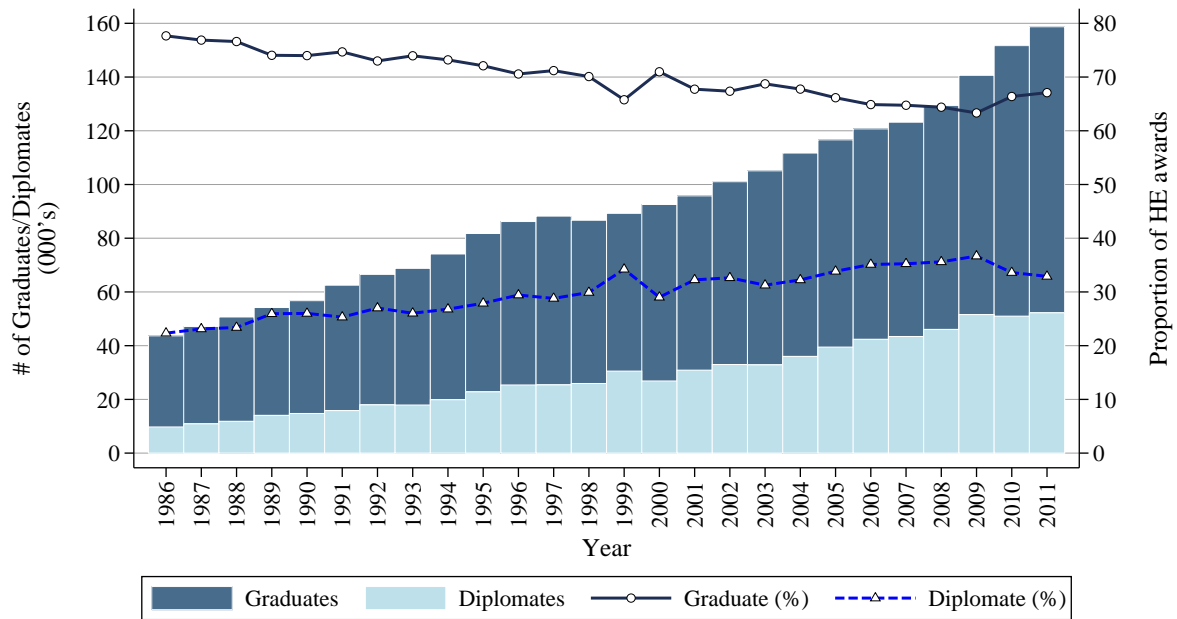
The policy changes which have altered the South African HE landscape over the past two and a half decades have coincided with a significant rise in the total number of tertiary-educated individuals produced each year. Figure 3.1 shows that while only just over 40 000 individuals graduated from HEIs with university or technikon qualifications in 1986, this number had more than doubled by 1996. Following a period of relative stagnation between 1996 and 2000, the number of *diplomates* and graduates produced annually again began to rise rapidly and by 2011 South Africa's 23 universities produced just short of 160 000 HEI-educated individuals each year. However, as can also be seen from Figure 3.1, the number of HE-educated individuals with *diplomate*-level qualifications has been rising faster than the number of individuals with graduate-level qualifications. Where approximately 3.5 graduates were produced for each *diplomate* in 1986, this ratio had fallen to just over 2 graduates per *diplomate* by 2011. Thus, while graduates still represent the bulk of HE-educated individuals produced by universities each year, their relative share of South Africa's stock of HE-educated individuals is steadily declining.

In addition to the expansion of South Africa's yearly graduate outputs, the nature of the policy changes which have affected the HE system over the past 25 years means that the demographic composition of South Africa's stock of graduates has also changed radically over time. This is clearly evident when looking at changes in the racial composition of the graduates produced by the HE system each year. Figure 3.2 reveals that, while the number of White graduates produced annually has increased only moderately from about 27 500 to just over 35 000 in the past 25 years, the number of Black graduates produced has increased more than 16-fold from about 3 400 in 1986 to more than 55 600 in 2011. The implications of the racial differences in graduate output growth are simple: while the HE system produced 7.9 White graduates for each Black graduate in 1986, by 2011 it produced 1.6 Black graduates for every single White graduate. Figure 3.3 offers a similarly poignant illustration of the extent of change in the racial composition of South Africa's stock of graduates by showing the respective racial shares of the total number of graduates produced in each year since 1986.

⁴ Traditional universities and universities of technology respectively resemble the pre-amalgamation general academic universities and technikons in function, with the former offering mainly theoretically-oriented diplomas and degrees and the latter mainly vocational diplomas and degrees. Comprehensive universities offer a combination of these types of qualifications.

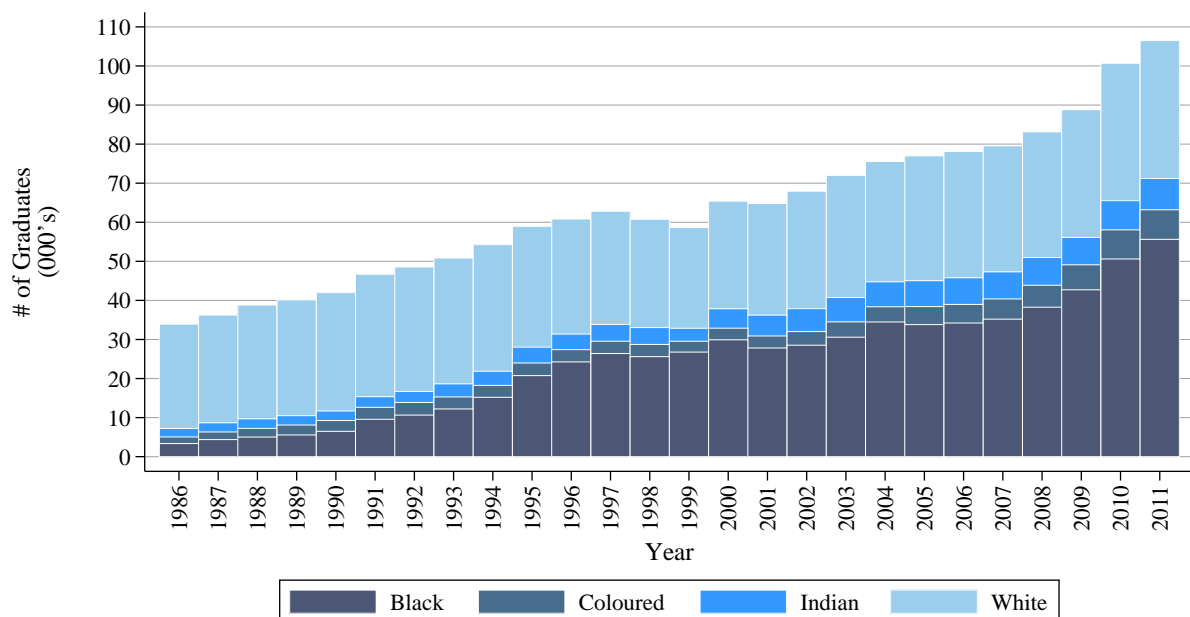
⁵ The present-day Cape Peninsula of Technology, Durban Institute of Technology, University of Kwazulu-Natal, North West University, and Tshwane University of Technology, for example, were all created from the merger of historically disadvantaged and historically advantaged HEIs.

Figure 3.1: Annual Graduate and Diplomat output of the South African HE system (1986 - 2011)

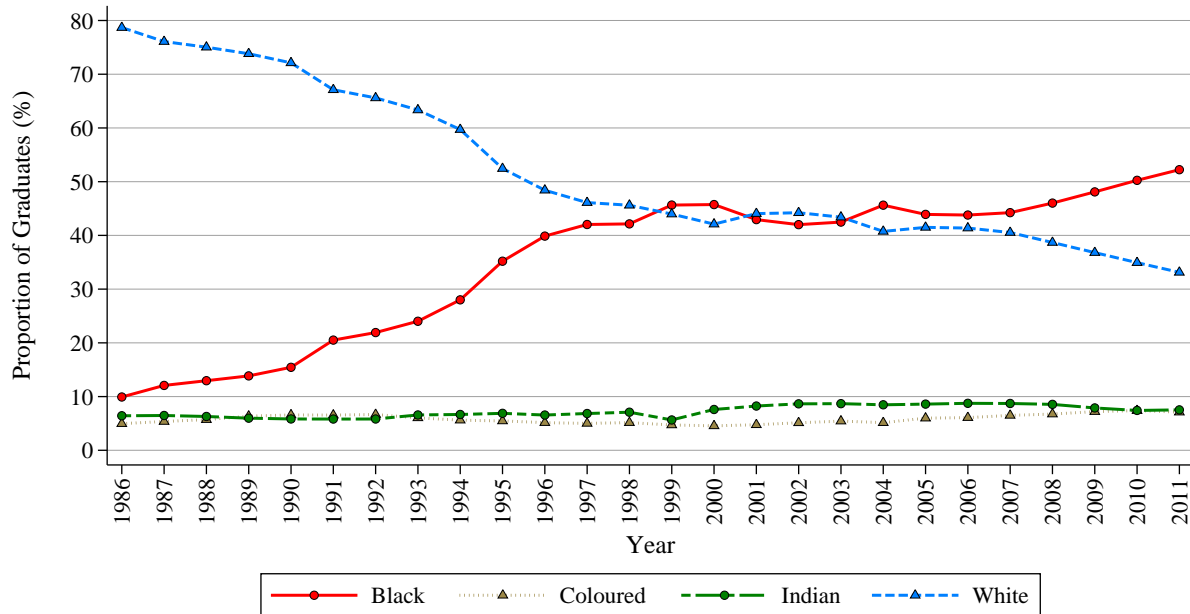


Source: Own calculations using HEMIS aggregate figures. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher. *Diplomates* comprise HE-educated individuals with NQF exit level 5 or 6 qualifications.

Figure 3.2: Number of Graduates produced annually by race (1986 - 2011)



Source: Own calculations using HEMIS aggregate figures. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

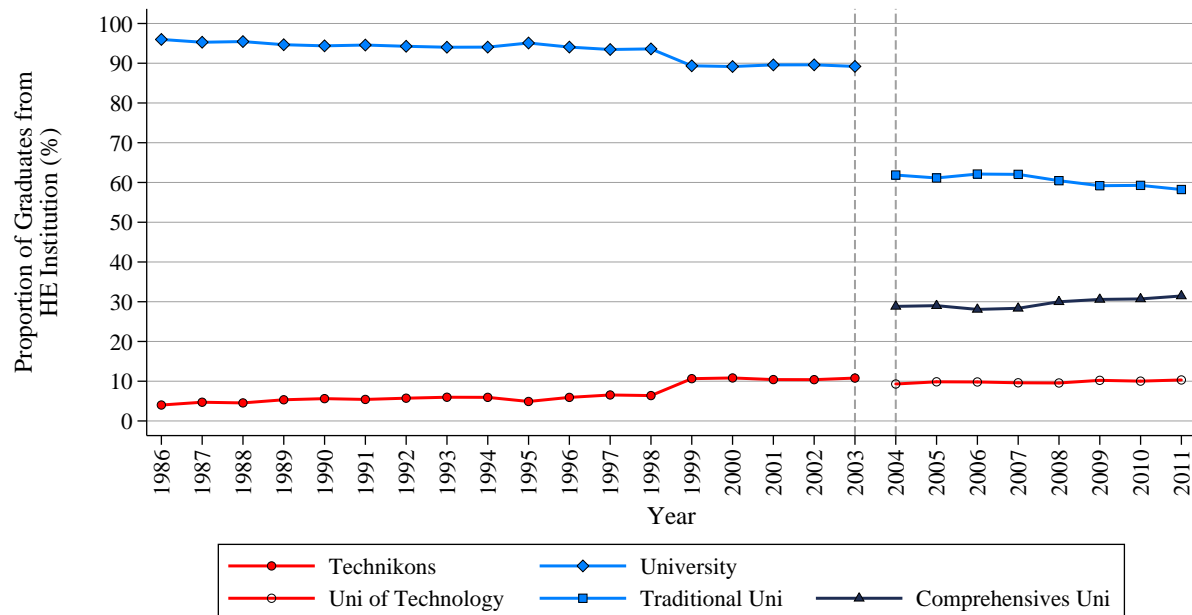
Figure 3.3: Share of annually produced Graduates by race (1986 - 2011)

Source: Own calculations using HEMIS aggregate figures. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

Figure 3.4 shows how the amalgamation of technikons and universities in South Africa in 2004 impacted on the relative contributions made by different types of HEIs to total annual graduate outputs. Prior to 2004, universities produced around 90% of all graduates produced each year. However, since 2004, only about 60% of all new graduates have attended traditional universities, with 30% of graduates now being produced by comprehensive universities. Given that all universities of technology either used to be technikons or were created through the merger of technikons, it is not surprising that this part of the HE system still contributes only about 10% of graduates produced every year, just as it did before the amalgamation.

As mentioned before, the amalgamation of South Africa's 36 former HEIs not only had the effect of reducing the total number of HEIs in the country, but also entailed that some HDIs merged with HAIs. From the perspective of analysing the relative contributions of the historically disadvantaged and historically advantaged parts of the HE system to the total number of graduates produced each year, this is problematic since it is no longer clear to what extent these institutions can accurately be classified as either HDIs or HAIs. This problem is illustrated in Figure 3.5, which shows the respective HDI and HAI shares of total graduate production. Abstracting from the relative decline in the proportion of graduates produced by HAIs between 1986 and 1997, HAIs and HDIs respectively produced around 80% and 20% of South Africa's graduates by 2003. However, if one applies the classification commonly used in the literature on South Africa's HE system whereby institutions that were either already classified as historically disadvantaged before 2004 or were merged with HDIs as part of the amalgamation are now also be described as HDIs, there is a large, discontinuous change in the relative contributions of HDIs and HAIs.⁶ Specifically, this classification makes it seem as though HDIs have been producing just short of

⁶ According to this classification, the new HDIs include 12 institutions: University of Fort Hare, University of KwaZulu-Natal,

Figure 3.4: Share of Graduates produced by HE Institution Type (1986 - 2011)

Source: Own calculations using HEMIS aggregate figures. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

40% of all new graduates since 2004.

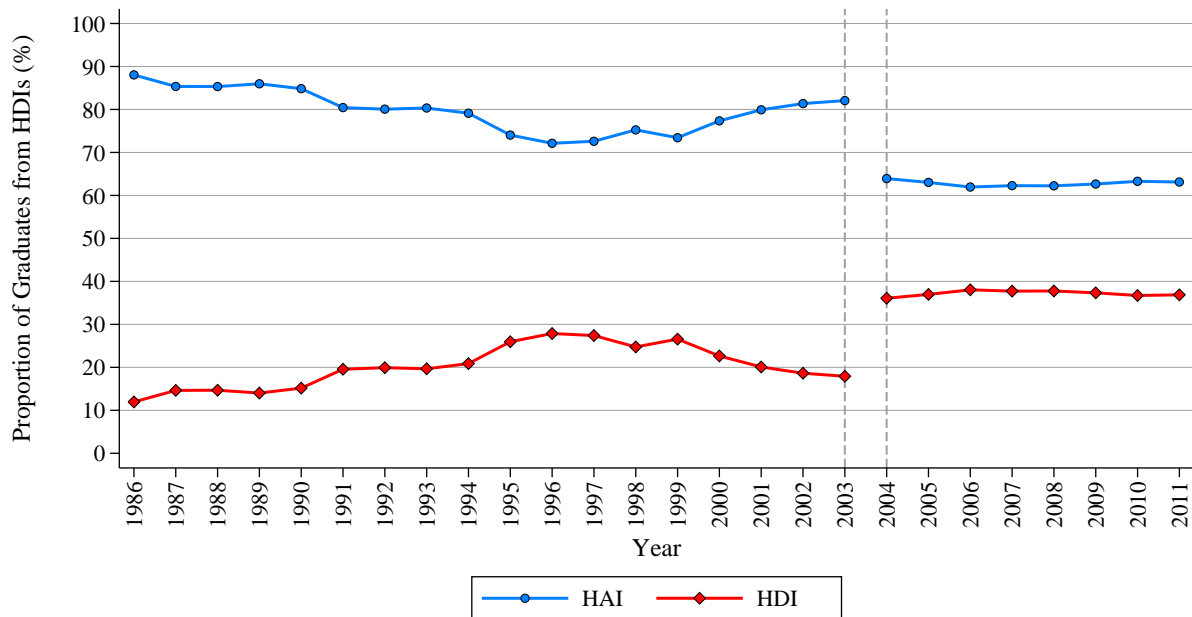
Due to the potential pitfalls inherent in using a classification which is based solely on historical status to evaluate post-amalgamation HEIs, CHET (2010) proposes a three-cluster classification of South Africa's universities which expresses institutional differentiation in terms of observable criteria and performance measures (Fisher and Scott, 2011, p. 33).⁷ As shown in Table A.3, the first (red) cluster comprises South Africa's leading research institutions, all of which are HAIs. Cluster 2 (green cluster) is composed of both traditional and comprehensive universities while the third (blue) cluster includes all the universities of technology, most of which could be classified as HDIs, and two comprehensive universities (Fisher and Scott, 2011, p. 33). Though the original aim of the 3-cluster classification was to differentiate HEIs based on purpose, it nevertheless provides a useful hierarchical classification of institutional quality in different parts of the HE system.

Figure 3.6 shows the shares of total graduates produced each year by universities in the three different HEI clusters. In the long run, cluster 3 institutions have been increasing their graduate outputs relative to cluster 1 universities. In the last 10 years, however, cluster 3 institutions have been increasing their graduate outputs relative to both cluster 1 and cluster 2 institutions. By 2011, 47% of new graduates were

University of Limpopo, North West University, University of Venda, University of Western Cape, University of Zululand, Walter Sisulu University, Cape Peninsula University of Technology, Durban Institute of Technology, Tshwane University of Technology, and Mangosuthu Technikon.

⁷ The observable input criteria used in the construction of the three CHET (2010) HE institutional clusters include: the percentage headcount enrolment in science, engineering and technology; the percentage master and doctoral headcount enrolments; the student to academic and/or research staff FTE ratio; the percentage of permanent academic and/or research staff with doctoral degrees; the percentage private income; and the government and/or student fee income per FTE student. The performance measures used in the construction of the clusters include student success rates, graduation rates, and the weighted research outputs units per permanent academic and research staff member.

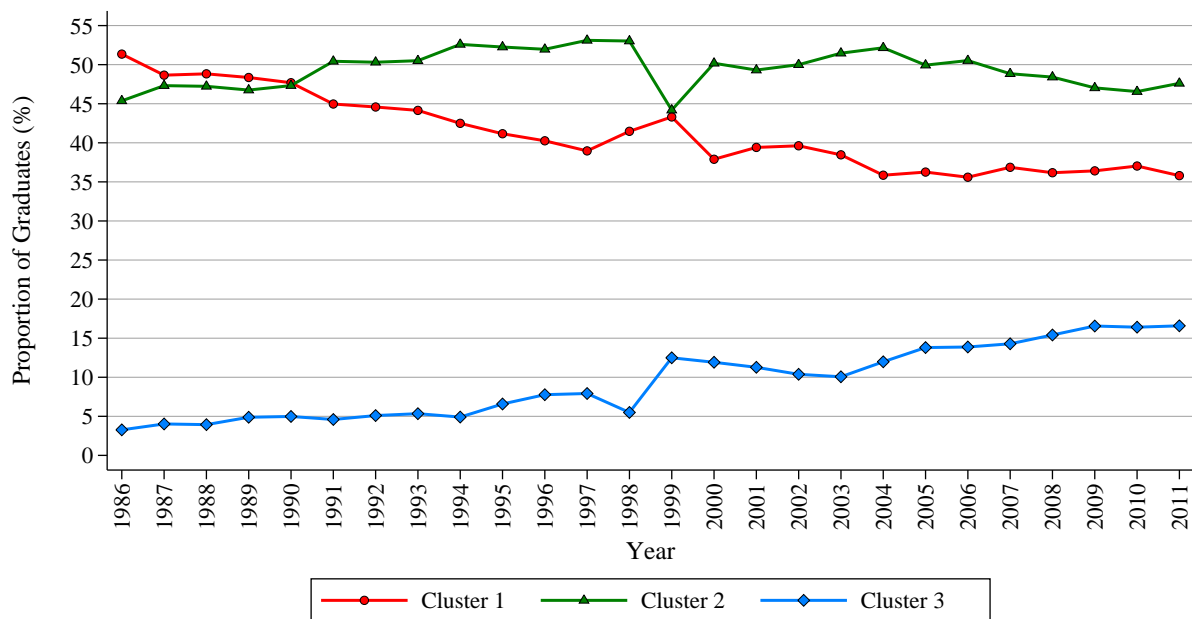
Figure 3.5: Percentage of Graduates produced by HDIs and HAIs (1986 - 2011)



Source: Own calculations using HEMIS aggregate figures. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

being produced by cluster 2 universities, followed by 36% by cluster 1 universities and 17% by cluster 3 universities.

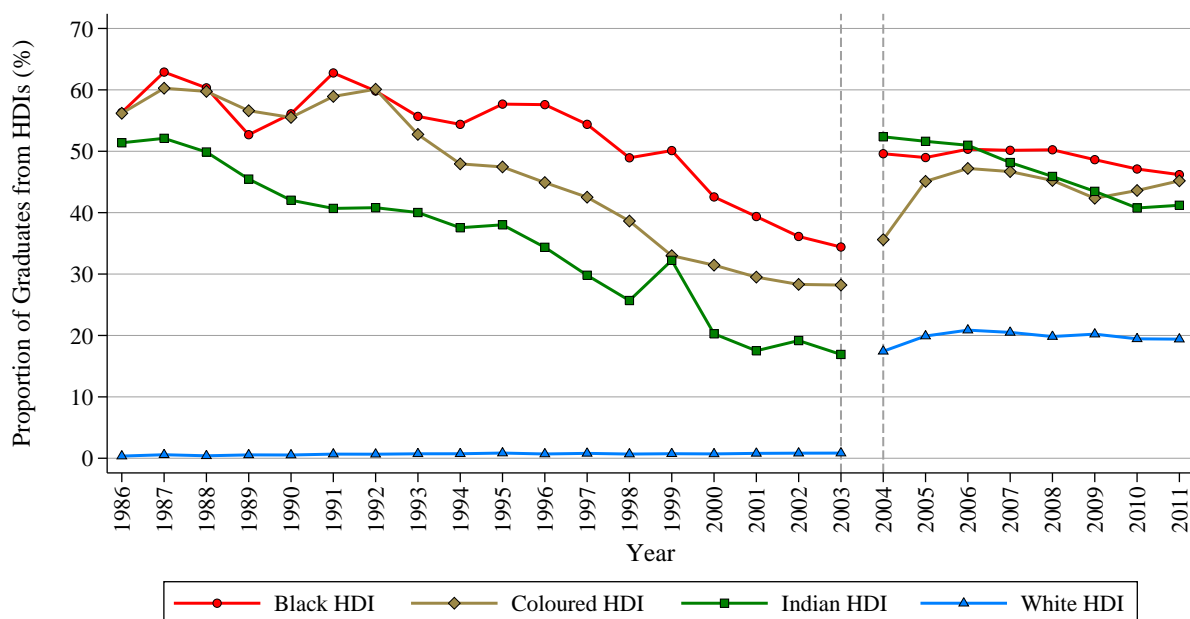
Figure 3.6: Share of graduates produced annually by HE institutional cluster (1986 - 2011)



Source: Own calculations using HEMIS aggregate figures. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

The racial dimensions of historical status in South Africa's HE system coupled with the significant expansion of the number of Black graduates produced by the country's HEIs over the past 25 years imply that the aforementioned changes in the HE landscape are unlikely to pertain equally to all race groups. This is confirmed by Figure 3.7 which shows marked differences in the proportions, and changes in the proportions, of Black, Coloured, Indian, and White graduates produced by HDIs. In 1986, more than 50% of Indian, Coloured, and Black graduates graduated from HDIs. By 2003, the percentage of Black graduates from HDIs had fallen to 35%, the percentage of Coloured graduates from HDIs to 29%, and the proportion of Indians from HDIs to 18%. Ignoring what is most likely a definition-driven discrete jump in the proportion of graduates from HDIs across all race groups between 2003 and 2004, it appears as though the historical downward trend in the proportion of Black and Indian graduates from HDIs has continued in the years following the amalgamation. Despite these declines, however, Figure 3.7 suggests that a far greater proportion of Black, Coloured, and Indian graduates still graduate from lower quality HEIs than Whites. This supposition is supported by Figure 3.8 which shows that, while 57% and 39% of White graduates respectively graduated from cluster 1 and cluster 2 institutions in 2011, a mere 5% graduated from cluster 3 institutions. By contrast, in the same year over 50% of Black graduates graduated from cluster 2 institutions and percentage of Black graduates from cluster 1 or cluster 2 institutions was roughly equal at about 25% each.

Figure 3.7: Share of Black, Coloured, Indian, and White Graduates produced by HDIs (1986 - 2011)

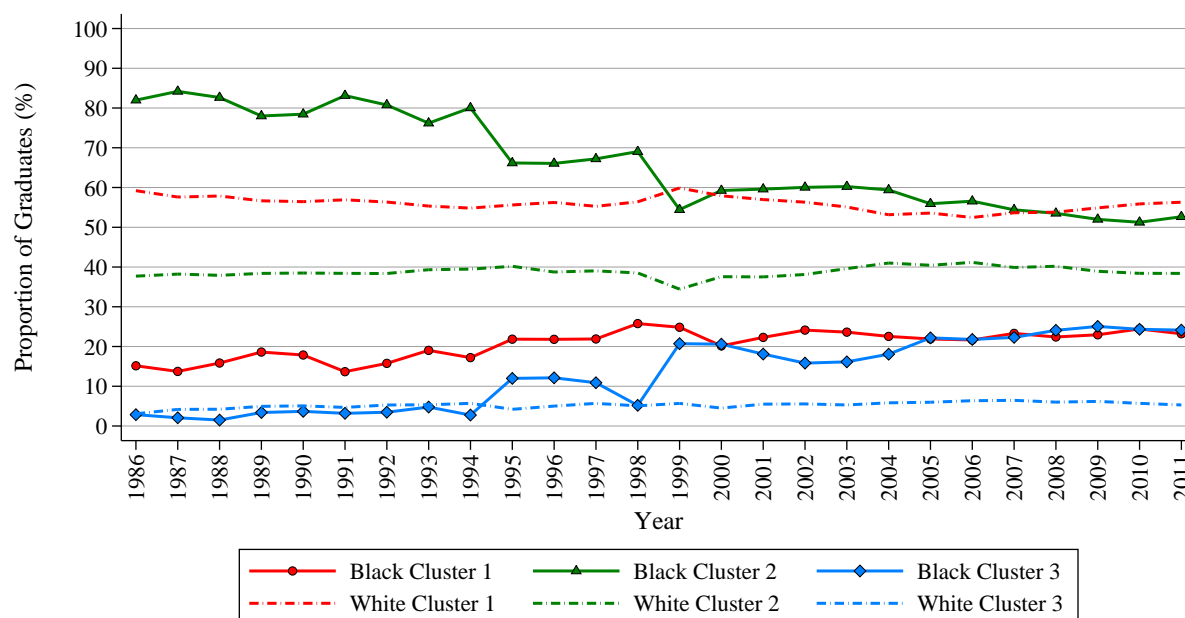


Source: Own calculations using HEMIS aggregate figures. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

It is reasonable to expect the various features of South Africa's HE system and the changes in the HE landscape outlined above to have important implications for the labour market prospects faced by the country's graduates. In the absence of a commensurate increase in the demand for graduate labour and expansion of the labour market's capacity to absorb graduates into graduate-level jobs over the past 25 years, the rapid rise in the number of graduates produced by the HE system each year should mean that

new graduates find it increasingly difficult to procure employment. Second, and perhaps more importantly, the significant expansion of South Africa's stock of Black graduates, in particular, must be viewed in the context of historically limited access to quality HE. That is, because of historical inequalities in access to quality education, the fact that South Africa's stock of graduates are becoming increasingly Black over time also means that South Africa's stock of graduates are increasingly being supplemented by individuals who are likely to have received their tertiary education in the poorer performing parts of the HE system. As such, it is at the very least plausible that part of the difference in the unemployment rates observed for Black and White graduates could be attributed to the fact that a far greater proportion of Black graduates (more than 75%) graduate from cluster 2 or 3 HEIs than White graduates, the majority of which graduate from cluster 1 institutions.

Figure 3.8: Share of Black and White Graduates by HEI cluster (1986 - 2011)



Source: Own calculations using HEMIS aggregate figures. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher.

4 Relating HEIs to Graduate Unemployment and Employment Probabilities

The discussion above alludes to the fact that historical patterns of access to HEIs, persistent heterogeneity in the type and quality of university education, and the changing demographic composition of the country's stock of graduates are likely to be important for explaining racial graduate labour market outcome differentials in South Africa. However, no study has thus far been able to examine on a nationally representative basis the extent to which the nature of the specific HEIs attended by graduates impact on the probabilities that they will be employed or unemployed. This is largely attributable to the fact that there is no existing dataset for South Africa that allows information on the HEIs attended by graduates

to be linked directly to the labour market outcomes they face.⁸ As such, the success of any attempt to empirically investigate the relationship between HE institutional features and graduate labour market outcomes in South Africa hinges on the extent to which it is possible to “match” or “link” information regarding graduate labour market outcomes in one dataset, to information regarding graduate HE institutional aspects in another dataset.

4.1 Data

The analysis which follows exploits two distinct sources of data on South African graduates. The first is a pooled sample of cross-sectional labour force data for working-age graduates obtained from Statistics South Africa’s March and September 2000- 2007 Labour Force Surveys (LFS) and its 2008Q1 - 2011Q4 Quarterly Labour Force Surveys (QLFS). The second source of data comes from the Department of Higher Education and Training’s (DHET) Higher Education Management Information System (HEMIS), an administrative database containing detailed records of every individual who has graduated from a public HEI in South Africa, including the specific HEI from which they graduated. While the pooled labour force survey data (hereafter collectively referred to as *LFS data*) covers the period 2000 - 2011, individual-level HEMIS data was only available for the period 2000 - 2009.

4.2 Methodology

In order to examine the impact of HEI type and quality on graduate employment and unemployment probabilities, it is first necessary to find a way of linking the information on graduates in the HEMIS data to information on graduates in the LFS data. The approach proposed here is a form of probabilistic cell-matching which entails using the availability of common time-invariant demographic variables found in both the LFS and HEMIS data to estimate the probability that two records are, in fact, the same. More accurately, by using information that is unique across different combinations of time-invariant demographic variables in both the HEMIS and LFS data, the approach exploits the fact that it is theoretically possible to assign to each graduate in the LFS data an estimated probability of having graduated from a given South African HEI. In practice, this approach is implemented in four stages.

1. Find all of the time-invariant demographic variables that are common across the HEMIS and LFS data.

HEMIS demographic variables: $\mathbf{X}^H, \mathbf{Y}^H \dots \mathbf{Z}^H$

LFS demographic variables: $\mathbf{X}^L, \mathbf{Y}^L \dots \mathbf{Z}^L$

Denote by \mathbf{x}_i^j the i^{th} observation of variable \mathbf{X} in dataset j .

⁸ On the one hand, none of the nationally representative labour force survey datasets available for South Africa contain information on the tertiary institutions where graduates obtained their qualifications and on the other hand, HE administrative records containing detailed information on the individuals who have graduated from public HEIs in South Africa do not contain any information on the labour market outcomes subsequently faced by those graduates.

2. There is a finite number of unique combinations of observed values that the set of demographic variables takes on in each dataset. Construct an index variable \mathbf{c} that uniquely identifies each of these unique combinations that occurs in either dataset. That is $\mathbf{c}_i^j \in \mathcal{C}$ where \mathcal{C} is the set of indices of unique patterns in $\{\mathbf{X}^H, \mathbf{Y}^H, \dots, \mathbf{Z}^H\} \cup \{\mathbf{X}^L, \mathbf{Y}^L, \dots, \mathbf{Z}^L\}$. Or in other words:

$$\mathbf{c}_i^j = \mathbf{c}_m^k \text{ if and only if } (\mathbf{x}_i^j = \mathbf{x}_m^k \text{ and } \mathbf{y}_i^j = \mathbf{y}_m^k \text{ and } \dots \text{ and } \mathbf{z}_i^j = \mathbf{z}_m^k)$$

$$1^m (X^L = x_m^L, Y^L = y_m^L, \dots, Z^L = z_m^L) = c_m^L \quad \forall m \in M$$

3. Let HEI be an index that takes on values in a set U that identifies the HEI from which individual i in the HEMIS data graduated. Calculate for each unique value of the index c in the HEMIS data, the proportion of graduates who graduated from a specific current or former South African HEI, u . Call this variable $\mathbf{p}_{\mathbf{u}}^j$ in dataset j . Note that there is one variable for each HEI represented in the HEMIS dataset.⁹

$$\mathbf{p}_{\mathbf{u}_i}^H = \Pr(HEI_i = u | \mathbf{c}_i^H = c) = \frac{\sum_{j=1}^N 1(\mathbf{c}_j^H = c) 1(HEI_j = u)}{\sum_{k=1}^N 1(\mathbf{c}_k^H = c)}$$

$$\forall (u, c) \in U \times \mathcal{C}^H$$

where

$1(\cdot)$ denotes an indicator function

4. Wherever the index of unique pattern matches between datasets, assign to that observation in the LFS data the $\mathbf{p}_{\mathbf{u}}$ value in the HEMIS dataset constructed in step 3. If a particular pattern in LFS does not have a counterpart in the HEMIS data, a missing value is recorded.

$$\mathbf{p}_{\mathbf{u}_j}^L = \begin{cases} \mathbf{p}_{\mathbf{u}_i}^H & \text{if } \mathbf{c}_j^L = \mathbf{c}_i^H \\ \emptyset & \text{otherwise} \end{cases}$$

This approach is hereafter simply referred to as “*p-linking*”. It should be obvious that its accuracy depends on the extent to which the values of the criterion, c , uniquely identify the different observations in the LFS and the HEMIS data. This, in turn, is a function of the number of unique possible combinations of the identifier variables in relation to the total number of observations in each sample under consideration.

Due to the fact that the questions regarding the highest education qualifications held by respondents in the LFS and QLFS changed between 2000 - 2011, three nested criteria had to be used sequentially to *p-link* LFS graduates to HEMIS HEIs. *Criterion 1* - the strictest criteria - consisted of unique combinations of respondents’/students’ year of birth, race, gender, the type of graduate qualification held or awarded (e.g. a bachelors degree, post-graduate diploma, or master’s degree or higher qualification), and the broad field of study in which the highest qualification was attained.¹⁰ As no *field of study* questions were asked

⁹ Effectively, this entails averaging the variables of interest (specific university attended) over each unique value of the criterion.

¹⁰ The 2000 to 2007 March and September LFSs use the 12-category South African Qualifications Authority (SAQA) classification of field of study whereas the HEMIS data uses the 22-category Department of Education (DoE) second order classification of educational subject matter (CESM) classification of field of study. In order to use these variables as identifi-

in the 2008 - 2011 QLFSs, *criterion 2* consisted of unique combinations of respondents'/students' year of birth, race, gender, and the type of graduate qualification held or awarded (e.g. a bachelors degree, post-graduate diploma, or master's degree or higher qualification). Finally, *criterion 3* consisted only of unique combinations of respondents'/students' year of birth, race and gender. In all cases, an attempt was made to first *p-link* on *criterion 1*, then on *criterion 2* and, in the event that a "link" still had not been established, on *criterion 3*.

Given that the HEMIS data is only available for the period 2000 - 2009 and that it is not known when graduates observed in the LFS data graduated from the HEIs they attended, the *p-linking* approach implicitly assumes that all LFS graduates for the period 2000 to 2011 graduated between 2000 and 2009.¹¹ Furthermore, for obvious reasons, LFS data graduates can only be *p-linked* retrospectively as it is not possible, for example, for a graduate observed in the 2001 March LFS data to only have graduated in a year after 2001. This implies that 2000 LFS data graduates could only be *p-linked* using 2000 HEMIS data, 2001 LFS data graduates could only be *p-linked* using 2000 - 2001 HEMIS data, and so forth.

Based on these assumptions, each graduate in the LFS data was *p-linked* to the HEMIS data. Table B.1 in Appendix B shows the number of unique combinations for each of the 3 *p-link* criteria in the LFS and HEMIS data in relation to the sample sizes for each of the datasets under consideration. Based on this information, Table B.2 shows the percentages of LFS graduates in each year that could be *p-linked* successfully using the 3 available criteria. Once the LFS graduates were "linked", the inferred probabilities regarding the specific HEIs from which they are likely to have graduated was used to calculate the respective probabilities that they graduated from a technikon, a comprehensive university, a traditional university, a university of technology, a HDIs, a HAIs, a Cluster 1 HEIs, a Cluster 2 HEIs, or a Cluster 3 HEIs. As a further potential diagnostic on the *p-linking* approach used, Tables B.3, B.4, and B.5 respectively show the actual proportions of HEMIS graduates who graduated from the various types of HEIs listed above, the proportion of graduates in the LFS data sample who, via *p-linking*, are estimated to have graduated from different types of HEIs, and the proportion of graduates in South Africa's working-age population who are estimated to have graduated from various HEIs.

4.3 The association between HEI type, quality and Graduate Unemployment and Employment

Having assigned to each graduate in the LFS data a set of variables capturing the estimated probability of having graduated from a HEI of specific type and quality, the analysis now proceeds to the estimation of the association between that HEI type or quality and graduate labour market outcomes. Specifically, a series of probit regressions were estimated to find the partial association between the probability that a graduate attended a specific type/quality of HEI and the probability that that graduate is narrowly unemployed/employed.¹² Each set of regressions has three permutations. The first uses the same specification

ers in the *p-linking* procedure, it was therefore necessary to convert the 22 CESM fields in the HEMIS data into the 12 SAQA fields as per (Mabizela, 2005, p. 94).

¹¹ More accurately, the *p-link* approach implicitly assumes that the conditional probability of having graduated from a specific HE institution before 2000 can be inferred directly from conditional probability of having graduated from that HEI between 2000 and 2009.

¹² As explained in Section 2, the narrow definition of unemployment is not only the most consistently defined across StatsSA's various labour force surveys, but the difference in broad and narrow unemployment rates for graduates is largely negligible.

for all the regression tables and includes only the main demographic variables that are assumed to have bearing on graduates' probabilities of unemployment/employment in the South African labour market.¹³ The second permutation includes a specific HEI type or quality probability variable or set of probability variables and the third permutation interacts that HEI type or quality probability variable or set of probability variables with graduates' race groups. As such, each set of results is expected to shed light on the following three questions: First, does the probability of having attended a specific type/quality of HEI have a significant impact on the probability of being unemployed/employed? Second, does controlling for the probability of having attended a specific type/quality of HEI change the extent of any unexplained differences in the probability of unemployment/employment between race groups? Finally, does the impact which the probability of having attended a specific type/quality of HEI has on the probability of unemployment/employment differ across race groups?

4.3.1 HEI Type, Quality and the Expect Probability of Narrow Unemployment for Graduates

The results of the various estimations are presented in Tables C.1 - C.8 in Appendix C. Column (1) in Table C.1 contains the results from permutation 1 and confirms most priors regarding the expected relationship between age, race, education and the probability that a graduate will be narrowly unemployed in the South African labour market. It is found that Coloured, Asian, and White graduates are all significantly less likely to be unemployed than their Black counterparts. Similarly, there is a statistically significant negative association between the level of one's graduate qualification and the probability of being unemployed. It is interesting to note, however, that female graduates are statistically no more likely to be unemployed than male male graduates.

The probability of having graduated from a technikon as opposed to a university is not statistically significant in regression (2) of Table C.1, nor does its inclusion change the coefficients on the race indicator variables in a statistically significant manner. When interacted with race group in permutation 3, however, it appears that the estimated probability of having attended a technikon rather than a university may matter for Asian/Indian graduates, a group for whom there is a statistically significant positive association between the probability of having graduated from a technikon and the probability of being unemployed.

The results from column (2) in Table C.1 show that, while the inclusion of the estimated probability of having attended either a comprehensive university, traditional university, or university of technology in South Africa does not alter the association between race and graduate unemployment probability in a statistically significant manner, it does predict that graduates from traditional universities are expected to have a significantly lower probability of unemployment than graduates from comprehensive universities. When the institutional type probabilities are interacted with race in column (3), it can be seen that the type of university likely to have been attended does not significantly impact on the probability of unemployment for either Black or White graduates. By contrast, Coloured and Indian graduates from traditional universities and coloured graduates from universities of technology have significantly lower probabilities

¹³All regressions include variables for *age*, *age-squared*, *race*, *gender*, *level of qualification held*, *province*, *enrolment in education*, and controls for *survey period*.

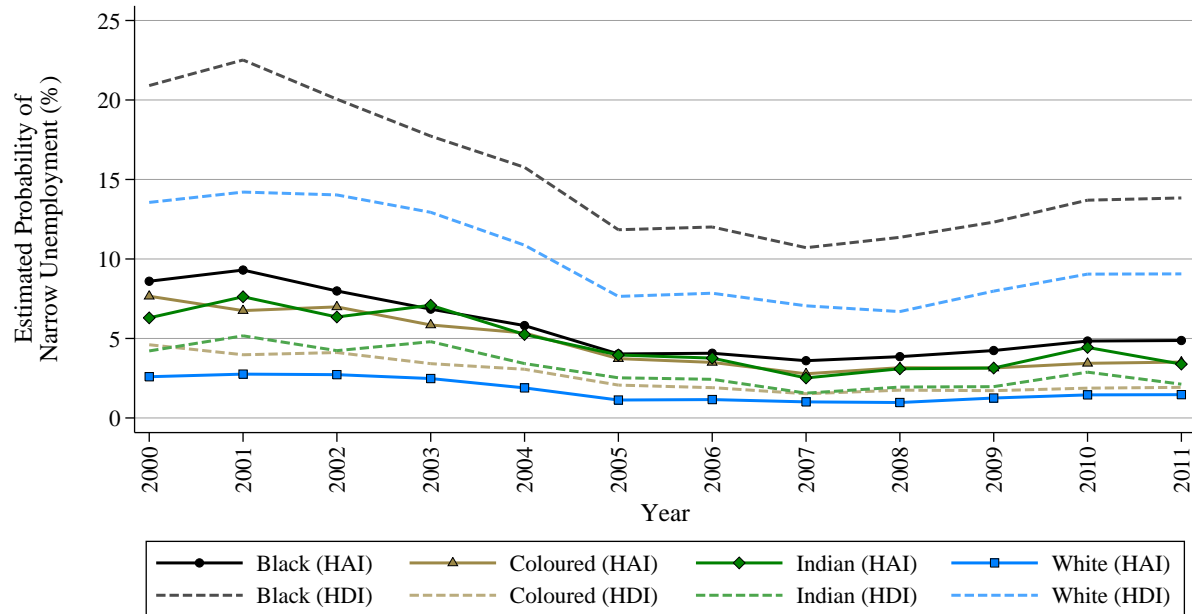
of unemployment than their counterparts who are likely to have attained their qualifications at comprehensive universities. In fact, interacting HEI type and race makes the coefficients on the Coloured and Indian race dummies statistically insignificant, suggesting that most of the difference in Coloured, Indian and Black graduate unemployment rates can be explained by the fact that the former two race groups are not only more likely to have attended traditional universities or universities of technology, but that they also have higher returns to do so.

Columns (2) and (3) in Table C.3 reveal not only that graduates who are likely to have graduated from HDIs have statistically significant higher probabilities of being unemployed than their counterparts from HAIs, but that the effect of attending a HDI or HAI on the probability of unemployment differs significantly between race groups. Furthermore, the inclusion of the *HDI* probability also reduces the magnitude of the unexplained differences in unemployment probability between race groups, particularly when the variable is interacted with race group. This is illustrated in Figure 4.1 which uses the predictions from regression (3) in Table C.3 to calculate the yearly expected probabilities of narrow unemployment for different race groups, conditional on having graduated either from a HDI or HAI. The graph suggests that part of the unexplained difference in unemployment rates for Black and White graduates can be explained by the fact that Black graduates have historically been far more likely to graduate from HDI than Whites. In fact, the figure shows that while unexplained differences remain even after controlling for the historical status of the institution likely to have been attended, the narrow unemployment rate for Black graduates from HAIs may be as much as 10 percentage points lower than the narrow unemployment rate for Black graduates from HDIs.

Finally, the results from regression (2) in Table (C.4) suggest that graduates who are likely to have graduated from cluster 2 or cluster 1 institutions are statistically no more or less likely to be unemployed than graduates from cluster 3 HEIs. When the cluster probabilities are interacted with race as in column (3) of Table (C.4), however, it appears that White graduates from cluster 2 institutions may have significantly higher probabilities of unemployment than White graduates from cluster 3 HEIs. Similarly, Indian graduates likely to have been educated at cluster 1 institutions are shown to have significantly lower expected unemployment rates than Indian graduates from cluster 3 institutions. Surprisingly, the cluster of the HEI likely to have been attended does not appear to matter for the expected narrow unemployment rate for Black graduates. This is illustrated graphically in Figure (4.2) which plots the expected predicted probabilities of narrow unemployment for Black and White graduates, conditional on the cluster of the HEI attended.

4.3.2 HEI Type, Quality and the Expect Probability of Employment for Graduates

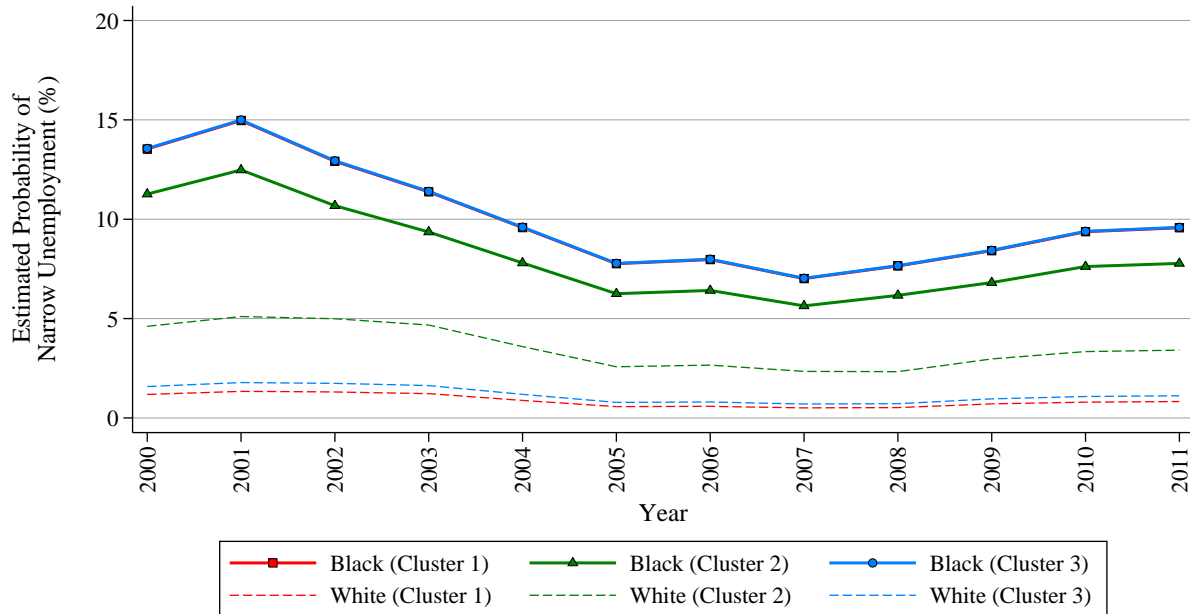
Tables C.5 - C.8 contain the results from probit regressions estimating the probability of graduate employment. The specifications used are the same as in Tables C.1 - C.4 with the exception that, this time, the dependent variable is employment status rather than narrow unemployment status. The changes brought about by looking at graduate employment rates rather than graduates unemployment rates are immediately obvious when comparing the results from column (1) of Table C.5 to column (1) in Table C.1. Coloured graduates clearly have a statistically significant higher probability of employment than Black graduates. By contrast, the difference in employment probabilities between Indian and Black

Figure 4.1: Predicted Probability of Narrow Unemployment by HAI and HDI (2000 - 2011)

Source: Own calculations using *p-linked* LFS data. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher. Predictions based on regression (3) in Table C.3. Estimates correspond to the mean predicted narrow unemployment probability for respective groups in each year. Estimates of expected graduate unemployment probability associated with attending a HDI generated using HDI = 1. Estimates of expected graduate unemployment probability associated with attending a HAI generated using HAI = 1. All other variables kept at their observed values in the data when calculating the respective expected graduate unemployment probabilities.

graduates is now statistically negligible and, while the difference in employment probabilities between White and Black graduates is still statistically significant, it does not seem to be particularly large in an economic sense. Another key difference in the results is that female graduates have statistically significant lower probabilities of employment than male graduates. Given that the narrow unemployment rate is simply the difference between the narrow labour force participation (LFP) rate and the employment rate, this finding implies that the fact the the narrow unemployment rates for female graduates are not statistically significant from those for male graduates can largely be attributed to the fact that female graduates have lower narrow LFP rates than male graduates. Interestingly, the results from regression (2) in Table C.5 show that graduates who are likely to have attended technikons have statistically significant higher probabilities of employment than graduates from universities. However, as column (3) shows, this effect appears to hold only for Black graduates.

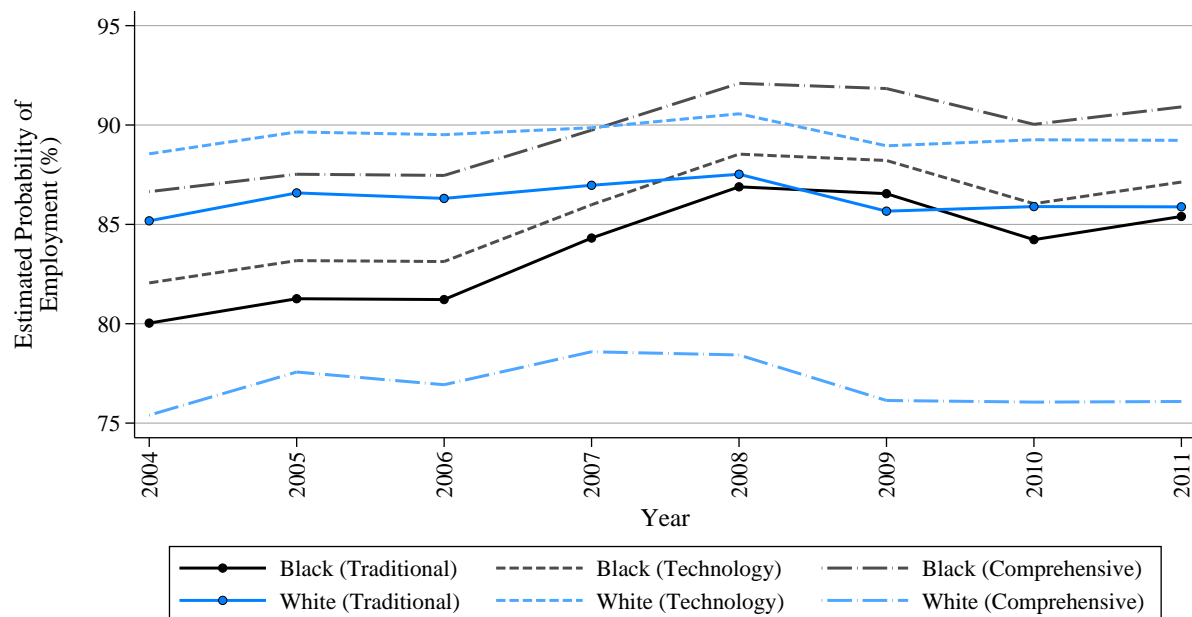
Table C.6 reveals that the type of post-amalgamation institution likely to have been attended has a statistically significant impact on graduate employment rates. Specifically, the results in column (2) suggest that graduates likely to have graduated either from traditional universities or universities of technology have higher employment probabilities than graduates more likely to have graduated from comprehensive universities. However, the association between HEI type is shown in column (3) to depend critically on race group. First, it appears that White and Indian graduates likely to have attended comprehensive universities have statistically significant lower probabilities of employment than their Black counterparts. Moreover, the association between the probability of having attended a traditional university rather than

Figure 4.2: Predicted Probability of Narrow Unemployment by HEI Cluster (2000 - 2011)

Source: Own calculations using *p-linked* LFS data. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher. Predictions based on regression (3) in Table C.4. Estimates correspond to the mean predicted narrow unemployment probability for respective groups in each year. Estimates of expected graduate unemployment probability associated with attending a cluster 1 HEI generated using cluster1 = 1, cluster2 = 0, cluster3 = 0. Estimates of expected graduate unemployment probability associated with attending a cluster 2 HEI generated using cluster1 = 0, cluster2 = 1, cluster3 = 0. Estimates of expected graduate unemployment probability associated with attending a cluster 0 HEI generated using cluster1 = 0, cluster2 = 0, cluster3 = 1. All other variables kept at their observed values in the data when calculating the respective expected graduate unemployment probabilities.

a comprehensive university and the probability of employment is statistically significant and positive for Whites and Indians, but statistically significant and negative for Black graduates. The association between the post-amalgamation HEI type likely to have been attended and the probability of employment is illustrated graphically for Black and White graduates in Figure 4.3. The figure reveals some surprising findings. It suggests that, since 2008, Black and White graduates from traditional universities may have had more-or-less the same probabilities of being employed. Furthermore, While white graduates from comprehensive universities are estimated to have the lowest employment probabilities across all institutions and race groups depicted, the reverse is true for Black graduates from comprehensive universities whose employment probabilities are estimated to have been in excess of 90% since 2007. All of these findings provide support for the notion that the type of HEI attended is likely to matter critically for explaining differences in observed differences in labour market outcomes between race groups.

Similar to the results from Table C.6, the estimation results in Table C.7 suggest not only that the historical status of the HEI likely to have been attended has a statistically significant association with the probability of graduate employment, but also that the nature and extent of this association differs across race groups. First, it is interesting to note that White and Indian graduates likely to have graduated from HAIs have statistically significant lower probabilities of employment than their Black counterparts. By contrast, Coloured, Indian, and White graduates from HDIs are far more likely to be employed than

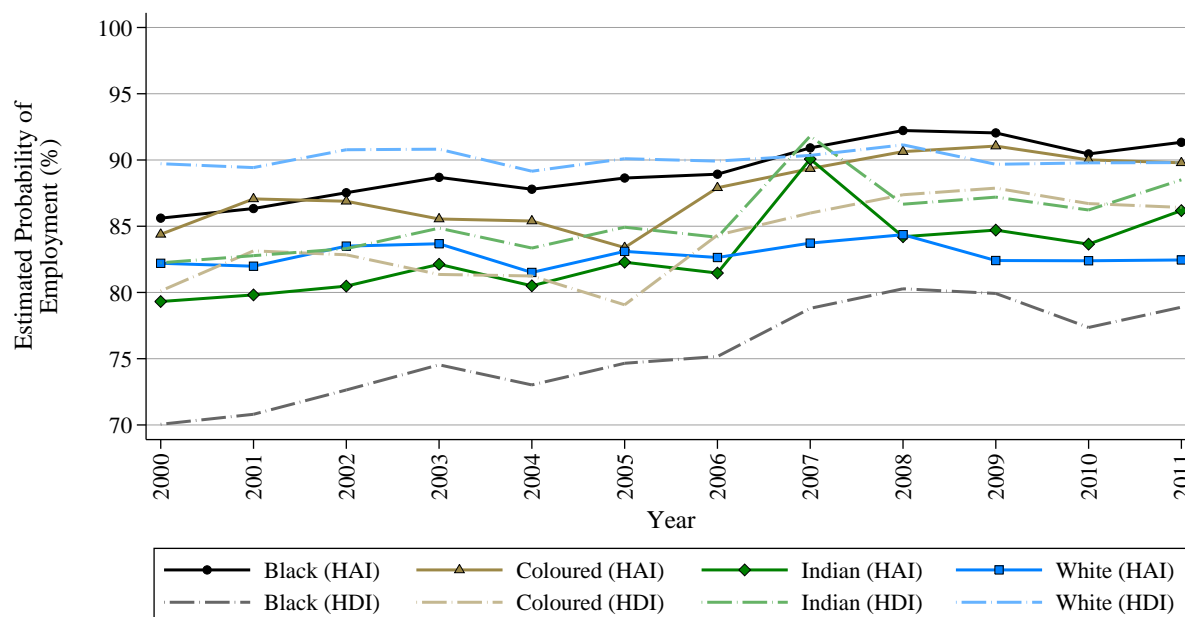
Figure 4.3: Predicted Probability of Employment for Black and White Graduates by post-amalgamation HEI type (2004 - 2011)

Source: Own calculations using *p-linked* LFS data. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher. Predictions based on regression (3) in Table C.6. Estimates correspond to the mean predicted narrow unemployment probability for respective groups in each year. Estimates of expected graduate employment probability associated with attending a comprehensive university generated using *comprehensive* = 1, *traditional* = 0, *technology* = 0. Estimates of expected graduate employment probability associated with attending a traditional university generated using *comprehensive* = 0, *traditional* = 1, *technology* = 0. Estimates of expected graduate employment probability associated with attending a university of technology generated using *comprehensive* = 0, *traditional* = 0, *technology* = 1. All other variables kept at their observed values in the data when calculating the respective expected graduate employment probabilities.

Black graduates from HDI. As before, these findings are illustrated graphically in Figure 4.4. The graph shows that, while the expected probability of employment for Black graduates from HDIs are the lowest for all groups, the expected probability of employment for Black graduates from HAIs are no lower than that for White graduates from HDIs or Coloured graduates from HAIs.¹⁴ However, it is important to note that the difference between the expected employment probabilities for Black and White graduates from HAIs is smaller than the difference between the expected employment probabilities for Black and White graduates from HDIs. This finding resonates with those found by others on the primary and secondary schooling system in South Africa which suggest that, while Blacks may benefit from attending HAIs, this benefit is generally overshadowed by the significant disadvantages to attending HDIs.

Finally, the results from Table C.8 suggest that the cluster of the HEI likely to have been attended has important bearing on the probability of employment. As before, the predictions from regression (3) are used to calculate the expected employment probabilities for Black and White graduates from different cluster HEIs in Figure 4.5. The graph shows that, while Black graduates from cluster 1 HEIs are predicted to have the lowest expected probabilities of employment, the probability of employment for

¹⁴ It is somewhat anomalous that White graduates from HDIs are predicted to have higher expected probabilities of employment than White graduates from HAIs.

Figure 4.4: Predicted Probability of Employment by HAI and HDI (2000 - 2011)

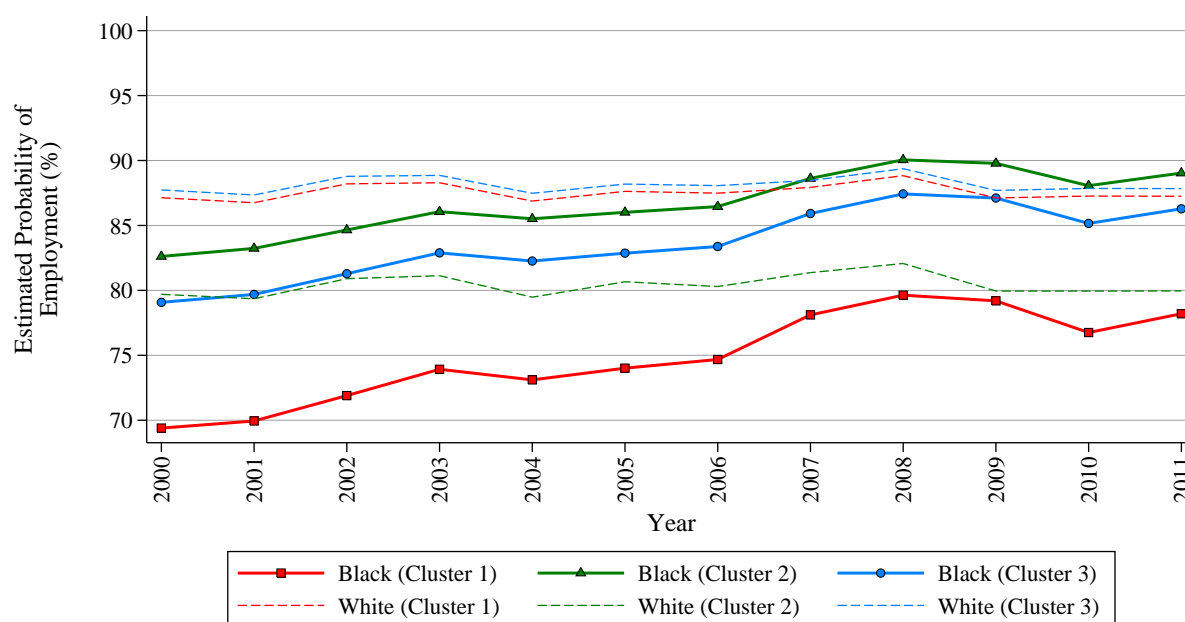
Source: Own calculations using *p-linked* LFS data. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher. Predictions based on regression (3) in Table C.7. Estimates correspond to the mean predicted employment probability for respective groups in each year. Estimates of expected graduate employment probability associated with attending a HDI generated using HDI = 1. Estimates of expected graduate employment probability associated with attending a HAI generated using HAI = 1. All other variables kept at their observed values in the data when calculating the respective expected graduate employment probabilities.

Black graduates from cluster 2 HEIs has been more-or-less the same as the probability of employment for White graduates from cluster 1 or cluster 3 HEIs since 2007. Similar to what was the case when looking at narrow unemployment probabilities in Table C.4, White graduates from cluster 2 institutions have significantly lower employment probabilities than White graduates from cluster 1 or cluster 3 HEIs.

5 Conclusion

The apparent paradox of high levels of graduate unemployment combined with persistent skills shortages in the South African labour market has often been attributed to structural changes which are held to have resulted in a misalignment between the skills that graduates traditionally have to offer and the skills that employers demand. It is claimed that the effects of this supposed skills-mismatch are further exacerbated by the severe heterogeneity in the quality of education received, even at the tertiary level, by different groups and cohorts in South Africa. When coupled with the signal eroding effect of substantial qualification inflation in the labour force over time and the significant changes in the demographic composition of South Africa's stock of graduates, it seems likely that this heterogeneity will have served to undermine the fidelity of graduate education credentials as signals of potential labour market productivity and, in general, reduced graduate employability. However, the results from this paper suggest that graduate unemployment in South Africa is not nearly as problematic as is often asserted. In part, this is

Figure 4.5: Predicted Probability of Employment for Black and White Graduates by HEI Cluster (2000 - 2011)



Source: Own calculations using *p-linked* LFS data. Notes: *Graduates* comprise HE-educated individuals with NQF exit level 7 qualifications or higher. Predictions based on regression (3) in Table C.4. Estimates correspond to the mean predicted employment probability for respective groups in each year. Estimates of expected graduate employment probability associated with attending a cluster 1 HEI generated using cluster1 = 1, cluster2 = 0, cluster3 = 0. Estimates of expected graduate employment probability associated with attending a cluster 2 HEI generated using cluster1 = 0, cluster2 = 1, cluster3 = 0. Estimates of expected graduate employment probability associated with attending a cluster 0 HEI generated using cluster1 = 0, cluster2 = 0, cluster3 = 1. All other variables kept at their observed values in the data when calculating the respective expected graduate employment probabilities.

simply because individuals with degrees or higher qualifications are often misguidedly lumped together with individuals with post-secondary diplomas and certificates under the collective “graduates”. Yet, the descriptive analysis in Section 2 shows precisely why such practice is dubious and leads to an inflated perception of graduate unemployment in South Africa.

Despite significant changes in the demographic composition of South Africa’s stock of graduates and policy changes which have altered South Africa’s HE landscape, graduates remain the group with the best labour market prospects relative to other education cohorts. This is true for all race groups, even though there remain differences in the employment and unemployment probabilities for Black, Coloured, Indian and White graduates. However, as the multivariate analysis shows, much of the racially-delineated differentials in graduate unemployment and employment outcomes in the country can potentially be attributed to heterogeneity in the types and quality of higher education institutions commonly attended by individuals from different racial backgrounds. For example, it is clear that having attended an HDI rather than a HAI is negatively associated with employment prospects and positively linked to the probability of unemployment. Insofar as HEI cluster can be used as a measure of HE quality, the findings from the regression analysis may seem perplexing. However, when considered in light of its original purpose, i.e. as a classification of HE function, it may simply be the case that different race groups benefit differently

from attending specific types of HEI.

The findings from the analysis suggest that more should be done to ensure that the type and quality of HE is incorporated when analysing the labour market prospects of graduates and that it is essential for researchers to have access to data that enable them to do so. While the probabilistic approach used in this paper perhaps offers a novel way of linking HEI aspects to graduate labour market outcomes, it is likely subject to large margins of error and is therefore not ideal. However, insofar as the results from the analysis are accurate, they imply that South Africa's HE institutions may perform vastly different functions in terms of providing pathways into the domestic labour market. It is clear that some race groups benefit more from education in some parts of the HE system than others. As such, policy interventions focussed on improving the labour market outcomes of Black and Coloured graduates, in particular, should be targeted at specific types of institutions and need not necessarily entail wide-scale reform of South Africa's HE system as a whole.

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Appendix A - Classification Tables

Table A.1: NQF Exit Level Classifications of Aggregate HEMIS Qualifications

HEMIS Qualification		NQF Exit Level					
Type	Code	5	6	7	8	9	10
<i>Technikons (1986 - 2003)</i>							
National Certificate	21	x					
National Higher Certificate	22		x				
National Diploma	23		x				
National Higher Diploma	25			x			
Baccalaureus Technologiae Degree	26			x			
Post-diploma Diploma	24				x		
Master's Diploma in Technology	27					x	
Magister Technologiae Degree	28					x	
Laureatus in Technology	29						x
Doctor Technologiae Degree	30						x
<i>Universities (1986 - 2003)</i>							
Undergraduate Diploma or Certificate (1 or 2 years)	11	x					
Undergraduate Diploma or Certificate (3 yrs)	1		x				
General Academic Bachelor's Degree	2			x			
Professional First Bachelor's Degree (3 years)	33			x			
Professional First Bachelor's Degree (4 years)	3				x		
Post-graduate Diploma or Certificate	4				x		
Post-graduate Bachelor's Degree	5				x		
Honours Degree	6				x		
Masters Degree	7					x	
Doctoral Degree	8						x
<i>All HE Institutions (2004 -)</i>							
Higher Certificate	41	x					
Advanced Certificate	42		x				
Diploma	43		x				
Advanced Diploma	44			x			
Bachelor's Degree (360 credits)	45			x			
Bachelor's Degree (480 credits)	46				x		
Postgraduate Diploma	47				x		
Bachelor Honours Degree	48				x		
Master's Degree	49					x	
Doctoral Degree	50						x

NOTES: National Qualifications Framework (NQF) exit level classifications of Higher Education Management Information System (HEMIS) qualifications based on the Higher Education Qualifications Framework (HEQF) Implementation Template and the South African Qualifications Authority's (SAQA) suggested NQF exit level classifications.

Table A.2: HE Institution Classifications Before and After Amalgamation in 2004

Pre-Amalgamation				Post-Amalgamation			
Instcode	Institute	HDI	HAI	Instcode	Institute	HDI	HAI
<i>Universities (Before 2004)</i>							
101	University of Cape Town		x	H02	UCT		x
102	University of Durban-Westville	x		H08	UKZN	x	
103	University of Fort Hare	x		H05	UFH	x	
104	Medical Uni. of South Africa	x		H09	UL	x	
105	University of Natal		x	H08	UKZN	x	
106	University of the North	x		H09	UL	x	
107	University of the Free State		x	H06	UFS		x
108	University of Port Elizabeth		x	H10	NMMU		x
109	Potchefstroom University		x	H11	NWU	x	
110	University of Pretoria		x	H12	UP		x
111	Rand Afrikaans University		x	H07	UJ		x
112	Rhodes University		x	H13	RU		x
113	University of South Africa		x	H14	UNISA		x
114	University of Stellenbosch		x	H15	US		x
115	University of Western Cape	x		H20	WITS	x	
116	University of Witwatersrand		x	H21	UV		x
117	University of Zululand	x		H22	UZ	x	
118	Vista University	x		*	*	x	
119	University of Transkei	x		H19	WSU	x	
120	University of North West	x		H11	NWU	x	
121	University of Venda	x		H17	UWC	x	
<i>Technikons (Before 2004)</i>							
301	Cape Technikon		x	H01	CPUT	x	
302	Northern Gauteng Technikon	x		H16	TUT	x	
303	Mangosuthu Technikon	x		H25	MUT	x	
304	M.L. Sultan Technikon	x		H04	DUT	x	
305	Natal Technikon		x	H04	DUT	x	
306	Technikon Free State		x	H03	CUT		x
307	Peninsula Technikon	x		H01	CPUT	x	
308	Port Elizabeth Technikon		x	H10	NMMU		x
309	Pretoria Technikon		x	H16	TUT	x	
310	Technikon SA		x	H14	UNISA		x
311	Vaal Triangle Technikon		x	H18	VUT		x
312	Witwatersrand Technikon		x	H07	UJ		x
313	Border Technikon	x		H19	WSU	x	
314	Technikon North West	x		H16	TUT	x	
315	Eastern Cape Technikon	x		H19	WSU	x	

NOTES: Former and current HE institution classifications based on Financial and Fiscal Commission (2012, p. 55), Bunting (2002, pp. 81 - 84). * Vista University's various satellite campuses were merged in to various universities including Nelson Mandela Metropolitan University (NMMU), University of the Free State (UFS), University of Johannesburg (UJ), University of Pretoria (UP), University of South Africa (UNISA), and the Vaal University of Technology (VUT).

Table A.3: Current HE Institution Classifications (post-amalgamation)

Incode	Abbrev	Institute	Traditional	Comprehensive	Technology	HDI	HAI	Cluster1	Cluster2	Cluster3
H01	CPUT	Cape Peninsula University of Technology			x	x			x	
H02	UCT	University of Cape Town	x				x	x		
H03	CUT	Central University of Technology, Free State			x		x		x	
H04	DUT	Durban Institute of Technology			x	x			x	
H05	UFH	University of Fort Hare	x			x			x	
H06	UFS	University of the Free State	x				x		x	
H07	UJ	University of Johannesburg		x			x		x	
H08	UKZN	University of KwaZulu-Natal	x			x		x		
H09	UL	University of Limpopo	x			x				x
H10	NMMU	Nelson Mandela Metropolitan University		x			x		x	
H11	NWU	North West University	x			x		x		
H12	UP	University of Pretoria	x				x	x		
H13	RU	Rhodes University	x				x	x		
H14	UNISA	University of South Africa		x			x		x	
H15	US	University of Stellenbosch	x				x	x		
H16	TUT	Tshwane University of Technology			x	x			x	
H17	UV	University of Venda		x		x				x
H18	VUT	Vaal University of Technology			x		x			x
H19	WSU	Walter Sisulu University		x		x				x
H20	UWC	University of Western Cape	x			x			x	
H21	WITS	University of Witwatersrand	x				x	x		
H22	UZ	University of Zululand		x		x				x
H25	MUT	Mangosuthu Technikon			x	x				x

NOTES: Current HE institution classifications based on Financial and Fiscal Commission (2012, p. 55), Bunting (2002, pp. 81 - 84). * Vista University's various satellite campuses were merged in to various universities including Nelson Mandela Metropolitan University (NMMU), University of the Free State (UFS), University of Johannesburg (UJ), University of Pretoria (UP), University of South Africa (UNISA), and the Vaal University of Technology (VUT). Traditional: Traditional University; Comprehensive: Comprehensive University; Technology: University of Technology; HDI: Historically Disadvantaged Institution; HAI: historically Advantaged Institution; Cluster1: CHET Cluster 1

Appendix B - P-linking Diagnostics

Table B.1: Unique Combinations and Sample Sizes across the 3 *p-link* criteria for the LFS and HEMIS samples

LFS Survey Year	HEMIS Data Years	Unique Combinations of Criteria Variables						Sample Size	
		Criteria 1		Criteria 2		Criteria 3		LFS	HEMIS
		LFS	HEMIS	LFS	HEMIS	LFS	HEMIS		
2000	2000	1429	5610	521	1162	322	576	2185	62998
2001	2000 - 2001	1948	7055	608	1323	354	613	3483	124585
2002	2000 - 2002	1871	8000	564	1404	332	644	3578	190144
2003	2000 - 2003	1867	8729	563	1479	332	670	3509	259991
2004	2000 - 2004	2069	9386	761	1561	333	698	3142	336196
2005	2000 - 2005	1808	15366	837	2735	338	717	2749	413521
2006	2000 - 2006	1747	16328	793	2836	317	737	2645	493658
2007	2000 - 2007	1748	17176	793	2928	322	754	2623	574391
2008	2000 - 2008	.	.	1018	3019	349	766	6737	658820
2009	2000 - 2009	.	.	1009	3093	347	781	6468	749005
2010	2000 - 2009	.	.	973	3093	345	781	6304	749005
2011	2000 - 2009	.	.	1051	3093	353	781	6747	749005

NOTES: Figures represent (a) the number of unique combinations of variables for each of the match criteria used and (b) the sample sizes of the respective LFS and corresponding HEMIS data samples against which they were "*p-linked*". Samples included only graduates with NQF exit level 7 or higher qualifications. Criterion 1: Unique combination of year of birth, race, gender, level of degree awarded (bachelor, postgrad, etc), and SAQA field of study. Criterion 2: Unique combination of year of birth, race, gender, and level of degree awarded (bachelor, postgrad, etc). Criterion 3: Unique combination of year of birth, race, and gender. Given that the "field of study" variable was not asked in the 2008 - 2011 QLFS questionnaires, it was not possible to use criterion 1 to *p-linked* 2008 - 2011 LFS graduates to HEMIS data. Figures correspond to sample estimates and are unweighted.

Table B.2: Percentage of LFS Sample Graduates “*p-linked*” to HEMIS data by criterion used.

LFS Year	HEMIS Years to Match on	Percentage successfully "matched"			
		Criteria 1	Criteria 2	Criteria 3	Unmatched
2000	2000	77.48	19.41	2.38	0.73
2001	2000 - 2001	86.94	11.83	0.95	0.29
2002	2000 - 2002	90.02	9.14	0.75	0.08
2003	2000 - 2003	91.34	8.15	0.43	0.09
2004	2000 - 2004	77.82	20.24	1.91	0.03
2005	2000 - 2005	91.2	8.15	0.58	0.07
2006	2000 - 2006	92.17	7.45	0.38	0
2007	2000 - 2007	91.57	8.08	0.34	0
2008	2000 - 2008	0	99.88	0.12	0
2009	2000 - 2009	0	99.98	0.02	0
2010	2000 - 2009	0	99.92	0.06	0.02
2011	2000 - 2009	0	99.78	0.21	0.01

NOTES: Figures represent the percentages of graduates for each year of the pooled LFS sample that were "*p-linked*" using a specific criterion. Linking criteria were used sequentially: An attempt was made to *p-linked* on criterion 1 first, then on criterion 2 and, finally, on criterion 3. The LFS sample included only graduates with NQF exit level 7 or higher qualifications. Criterion 1: Unique combination of year of birth, race, gender, level of degree awarded (bachelor, postgrad, etc), and SAQA field of study. Criterion 2: Unique combination of year of birth, race, gender, and level of degree awarded (bachelor, postgrad, etc). Criterion 3: Unique combination of year of birth, race, and gender. Given that the "field of study" variable was not asked in the 2008 - 2011 QLFS questionnaires, it was not possible to use criterion 1 to *p-linked* 2008 - 2011 LFS graduates to HEMIS data. Figures correspond to sample estimates and are unweighted.

Table B.3: Proportion of Graduates from the HEMIS Administrative Data Sample by type of HE Institution Attended

	Tech	Comp	Trad	UTech	HDI	Clust1	Clust2	Clust3
<i>(Gender)</i>								
Male	12.37	27.57	62.64	9.78	29.8	33.89	53.83	12.27
Female	9.54	29.23	62.09	8.67	32.44	30.37	58.38	11.25
<i>(Race)</i>								
Black	16.15	32.61	53.9	13.48	45.07	19.28	61.66	19.06
Coloured	17.86	18.55	66.4	15.05	40.36	32.51	52.38	15.11
Indian	6.46	23.41	70.68	5.92	39.28	24.02	69.77	6.21
White	6.88	26.57	68.25	5.18	13.41	46.84	47.96	5.2
<i>(Birth Cohort)</i>								
1930s	8.14	45.52	49.36	5.12	12.18	27.37	66.75	5.88
1940s	10.35	36.73	55.4	7.87	22.91	22.88	68.03	9.09
1950s	12.88	35.71	54.08	10.21	28.9	19.73	68.3	11.97
1960s	16.01	37.86	49.97	12.17	28.46	20.13	65.97	13.9
1970s	11.89	30.48	58.5	11.02	27.99	30.44	56.25	13.31
1980s	6.2	22.9	69.61	7.48	34.5	38.44	51.15	10.41
1990s	0	34.04	64.89	1.06	45.74	21.28	76.6	2.13
ALL	11.34	28.39	62.15	9.46	31.12	31.98	56.09	11.93

NOTES: Figures represent the actual proportions of graduates in HEMIS administrative data sample who graduated from specific types of HE institutions over the period 2000 - 2009. Tech: Technikon; Comp: Comprehensive university; Trad: Traditional university; UTech: University of Technology; HDI: Historically Disadvantaged Institution; Clust1: CHET Cluster 1; Clust2: CHET Cluster 2; Clust3: CHET Cluster 3.

Table B.4: Estimated Proportion of Graduates in the Labour Force Survey Sample by type of HE institution attended

	Tech	Comp	Trad	UTech	HDI	Clust1	Clust2	Clust3
<i>(Gender)</i>								
Male	21.55	36.38	48.65	14.96	22.53	23.51	59.88	16.61
Female	14.77	38.65	49.05	12.3	25.8	21.27	64.48	14.25
<i>(Race)</i>								
Black	19.41	34.84	48.3	16.86	38.52	15.28	63.77	20.95
Coloured	25.38	24.28	57.22	18.5	36	25.63	55.83	18.54
Indian	14.52	36.72	51.82	11.46	28.79	16.96	71.25	11.79
White	16.35	42.42	47.55	10.04	7.62	29.7	60.22	10.07
<i>(Birth Cohort)</i>								
1930s	21.16	52.02	35.16	12.82	5.22	18.89	67.78	13.34
1940s	14.43	48.72	41.57	9.71	11.81	19.31	70.43	10.26
1950s	21.41	40.94	43.61	15.45	18.43	17.98	65.7	16.32
1960s	20.72	42.1	42.22	15.68	20.96	18.39	64.65	16.95
1970s	16.33	33.01	53.37	13.62	30.03	24.92	58.95	16.13
1980s	11.89	22.46	69.65	7.89	37.1	36.49	51.71	11.8
1990s	.	22.4	65.21	12.39	52.26	22.12	62.83	15.05
ALL	18.17	37.52	48.85	13.63	24.16	22.39	62.18	15.43

NOTES: Figures represent the proportions of working-age graduates in the labour force survey data sample who are estimated to have graduated from specific types of HE institutions over the period 2000 - 2009, based on probabilistic matching between HEMIS administrative data and labour force survey data. Tech: Technikon; Comp: Comprehensive university; Trad: Traditional university; UTech: University of Technology; HDI: Historically Disadvantaged Institution; Clust1: CHET Cluster 1; Clust2: CHET Cluster 2; Clust3: CHET Cluster 3. Estimates are unweighted.

Table B.5: Estimated Proportion of Graduates in the Working-age population by type of HE institution attended

	Tech	Comp	Trad	UTech	HDI	Clust1	Clust2	Clust3
<i>(Gender)</i>								
Male	20.28	36.11	50.19	13.7	21.08	25.39	59.42	15.19
Female	13.45	38.87	50.42	10.71	24.12	23.52	63.97	12.51
<i>(Race)</i>								
Black	18.61	33.8	50.19	16.01	40.19	16.67	62.9	20.43
Coloured	25.32	23.94	57.85	18.2	36.7	26.28	55.48	18.24
Indian	14.38	35.58	53.53	10.89	29.33	17.65	71.2	11.15
White	15.46	41.73	49.02	9.25	7.82	30.74	59.96	9.3
<i>(Birth Cohort)</i>								
1930s	21.56	50.05	36.75	13.2	3.55	19.3	67.08	13.62
1940s	14.45	51.5	38.9	9.61	9.73	19.77	70.29	9.94
1950s	20.17	41.98	44.22	13.79	16.35	19.74	65.79	14.48
1960s	19.54	42.5	43.54	13.95	18.46	20.47	64.52	15.01
1970s	15.4	33.17	54.15	12.68	27.61	26.33	58.74	14.93
1980s	12.18	21.92	70.63	7.45	35.45	38.04	50.97	10.99
1990s	.	17.45	70.68	11.87	54.02	23.77	62.45	13.78
ALL	17.06	37.42	50.3	12.29	22.51	24.5	61.57	13.92

NOTES: Figures represent the proportions of working-age graduates in the South African population who are estimated to have graduated from specific types of HE institutions over the period 2000 - 2009, based on probabilistic matching between HEMIS administrative data and labour force survey data. Tech: Technikon; Comp: Comprehensive university; Trad: Traditional university; UTech: University of Technology; HDI: Historically Disadvantaged Institution; Clust1: CHET Cluster 1; Clust2: CHET Cluster 2; Clust3: CHET Cluster 3. Estimates are weighted.

Appendix C - Probit Regression Tables

Table C.1: Pre-amalgamation Type of HEI and Probability of Narrow Unemployment

	(1)	(2)	(3)
Age	-0.198***	-0.190***	-0.190***
Age ²	0.002***	0.002***	0.002***
Coloured	-0.604***	-0.599***	-0.568***
Indian	-0.460***	-0.455***	-0.518***
White	-0.703***	-0.714***	-0.713***
Female	-0.017	-0.011	-0.010
Honours or equiv	-0.130***	-0.147***	-0.146***
Masters+	-0.122**	-0.121*	-0.120*
Technikon		-0.111	-0.120
<i>Technikon</i> ×			
... <i>Coloured</i>			-0.125
... <i>Indian</i>			0.444**
... <i>White</i>			-0.007
Constant	3.343***	3.224***	3.239***
Observations	44702	44129	44129
P-value	0.000	0.000	0.000
Area under ROC curve	0.808	0.805	0.805
Sensitivity	75.663	75.091	75.181
Specificity	72.645	72.625	72.582
Cutoff used	0.05	0.05	0.05

NOTES: *Significant at the 10% level **Significant at the 5% level *** Significant at the 1% level. Significance levels are based on linearised robust standard errors. All regressions are estimated using Stata/SE 12.1's *svy: probit* command which executes a probit estimation for complex survey data. The dependent variable is *narrow unemployment*. The sample includes only working-age graduates in the narrow labour force from the pooled 2000a LFS - 20011QLFSQ4. All regressions include dummy controls for survey period., province, and enrolment at an educational institution. Reference categories are as follows: Race (Black); Gender (Male); Qualification (Bachelor's degree or equivalent); HE Institution (University). The chosen cut-off value for the calculated prediction sensitivity and specificity is equal to the proportion of the estimation sample who are narrowly unemployed.

Table C.2: Post-amalgamation Type of HEI and Probability of Narrow Unemployment

	(1)	(2)	(3)
Age	-0.196***	-0.205***	-0.205***
Age ²	0.002***	0.002***	0.002***
Coloured	-0.576***	-0.541***	0.377
Indian	-0.424***	-0.419***	0.118
White	-0.617***	-0.625***	-0.580***
Female	-0.068**	-0.074**	-0.071**
Honours or equiv	-0.128***	-0.102**	-0.121**
Masters+	-0.144**	-0.078	-0.107
Traditional University		-0.319**	-0.090
University of Technology		-0.338	-0.196
<i>Traditional University</i> ×			
... <i>Coloured</i>			-1.002**
... <i>Indian</i>			-0.914***
... <i>White</i>			-0.096
<i>University of Technology</i> ×			
... <i>Coloured</i>			-2.156***
... <i>Indian</i>			-0.172
... <i>White</i>			0.135
Constant	3.197***	3.609***	3.475***
Observations	46274	46272	46272
P-value	0.000	0.000	0.000
Area under ROC curve	0.798	0.800	0.802
Sensitivity	73.522	73.723	73.790
Specificity	73.060	73.087	74.092
Cutoff used	0.04	0.04	0.04

NOTES: *Significant at the 10% level **Significant at the 5% level *** Significant at the 1% level. Significance levels are based on linearised robust standard errors. All regressions are estimated using Stata/SE 12.1's *svy: probit* command which executes a probit estimation for complex survey data. The dependent variable is *narrow unemployment*. The sample includes only working-age graduates in the narrow labour force from the pooled 2004a LFS - 20011QLFSQ4. All regressions include dummy controls for survey period., province, and enrolment at an educational institution. Reference categories are as follows: Race (Black); Gender (Male); Qualification (Bachelor's degree or equivalent); HE Institution (Comprehensive University). The chosen cut-off value for the calculated prediction sensitivity and specificity is equal to the proportion of the estimation sample who are narrowly unemployed.

Table C.3: Historical Status of HEI and Probability of Narrow Unemployment

	(1)	(2)	(3)
Age	-0.198***	-0.188***	-0.186***
Age ²	0.002***	0.002***	0.002***
Coloured	-0.604***	-0.561***	-0.225*
Indian	-0.460***	-0.404***	-0.116
White	-0.703***	-0.545***	-0.524***
Female	-0.017	-0.026	-0.029
Honours or equiv	-0.130***	-0.094***	-0.092***
Masters+	-0.122**	-0.088	-0.086
HDI		0.474***	0.612***
<i>HDI</i> ×			
... <i>Coloured</i>			-0.893***
... <i>Indian</i>			-0.828***
... <i>White</i>			0.297
Constant	3.343***	2.952***	2.858***
Observations	44702	44685	44685
P-value	0.000	0.000	0.000
Area under ROC curve	0.808	0.808	0.808
Sensitivity	75.663	75.228	75.141
Specificity	72.645	73.528	73.780
Cutoff used	0.05	0.05	0.05

NOTES: *Significant at the 10% level **Significant at the 5% level *** Significant at the 1% level. Significance levels are based on linearised robust standard errors. All regressions are estimated using Stata/SE 12.1's *svy: probit* command which executes a probit estimation for complex survey data. The dependent variable is *narrow unemployment*. The sample includes only working-age graduates in the narrow labour force from the pooled 2000a LFS - 20011QLFSQ4. All regressions include dummy controls for survey period., province, and enrolment at an educational institution. Reference categories are as follows: Race (Black); Gender (Male); Qualification (Bachelor's degree or equivalent); HE Institution Historical Status (Historically Advantaged Institution). The chosen cut-off value for the calculated prediction sensitivity and specificity is equal to the proportion of the estimation sample who are narrowly unemployed.

Table C.4: Cluster Classification of HEI and Probability of Narrow Unemployment

	(1)	(2)	(3)
Age	-0.198***	-0.205***	-0.204***
Age ²	0.002***	0.002***	0.002***
Coloured	-0.604***	-0.575***	-0.978***
Indian	-0.460***	-0.475***	-0.272
White	-0.703***	-0.665***	-1.027***
Female	-0.017	-0.028	-0.022
Honours or equiv	-0.130***	-0.112***	-0.101**
Masters+	-0.122**	-0.071	-0.069
Cluster 1 Institution		-0.193	-0.001
Cluster 2 Institution		0.120	-0.126
<i>Cluster 1 Institution</i> ×			
... <i>Coloured</i>			0.343
... <i>Indian</i>			-0.845*
... <i>White</i>			-0.124
<i>Cluster 2 Institution</i> ×			
... <i>Coloured</i>			0.486
... <i>Indian</i>			-0.029
... <i>White</i>			0.640**
Constant	3.343***	3.468***	3.527***
Observations	44702	44684	44684
P-value	0.000	0.000	0.000
Area under ROC curve	0.808	0.808	0.809
Sensitivity	75.663	75.402	74.707
Specificity	72.645	73.100	73.749
Cutoff used	0.05	0.05	0.05

NOTES: *Significant at the 10% level **Significant at the 5% level *** Significant at the 1% level. Significance levels are based on linearised robust standard errors. All regressions are estimated using Stata/SE 12.1's *svy: probit* command which executes a probit estimation for complex survey data. The dependent variable is *narrow unemployment*. The sample includes only working-age graduates in the narrow labour force from the pooled 2000a LFS - 20011QLFSQ4. All regressions include dummy controls for survey period., province, and enrolment at an educational institution. Reference categories are as follows: Race (Black); Gender (Male); Qualification (Bachelor's degree or equivalent); HE Institution Cluster (Cluster 3 Institution). The chosen cut-off value for the calculated prediction sensitivity and specificity is equal to the proportion of the estimation sample who are narrowly unemployed.

Table C.5: Pre-amalgamation Type of HEI and Probability of Employment

	(1)	(2)	(3)
Age	0.271***	0.267***	0.267***
Age ²	-0.003***	-0.003***	-0.003***
Coloured	0.284***	0.283***	0.305***
Indian	0.004	0.005	0.033
White	0.051**	0.063**	0.064**
Female	-0.411***	-0.424***	-0.423***
Honours or equiv	0.145***	0.162***	0.163***
Masters+	0.293***	0.292***	0.293***
Technikon		0.107*	0.131*
<i>Technikon</i> ×			
... <i>Coloured</i>			-0.096
... <i>Indian</i>			-0.200
... <i>White</i>			-0.003
Constant	-4.261***	-4.238***	-4.241***
Observations	50074	49201	49201
P-value	0.000	0.000	0.000
Area under ROC curve	0.759	0.754	0.754
Sensitivity	72.963	72.339	72.315
Specificity	64.290	64.129	64.211
Cutoff used	0.85	0.85	0.85

NOTES: *Significant at the 10% level **Significant at the 5% level *** Significant at the 1% level. Significance levels are based on linearised robust standard errors. Regressions are estimated using Stata/SE 12.1's *svy: probit* command which executes a probit estimation for complex survey data. The dependent variable is *employment*. The sample includes only working-age graduates in the narrow labour force from the pooled 2000a LFS - 20011QLFSQ4. All regressions include dummy controls for survey period., province, and enrolment at an educational institution. Reference categories are as follows: Race (Black); Gender (Male); Qualification (Bachelor's degree or equivalent); HE Institution (University). The chosen cut-off value for the calculated prediction sensitivity and specificity is equal to the proportion of the estimation sample who are employed.

Table C.6: Post-Amalgamation Type of HEI and Probability of Employment

	(1)	(2)	(3)
Age	0.262***	0.272***	0.267***
Age ²	-0.003***	-0.003***	-0.003***
Coloured	0.226***	0.181***	0.252
Indian	-0.056	-0.053	-0.475***
White	-0.021	-0.002	-0.517***
Female	-0.387***	-0.375***	-0.373***
Honours or equiv	0.149***	0.099**	0.113***
Masters+	0.309***	0.215***	0.229***
Traditional University		0.341***	-0.330**
University of Technology		0.368**	-0.239
<i>Traditional University</i> ×			
...Coloured			0.098
...Indian			0.705***
...White			0.779***
<i>University of Technology</i> ×			
...Coloured			-0.295
...Indian			0.232
...White			0.891***
Constant	-3.878***	-4.346***	-3.798***
Observations	50122	50117	50117
P-value	0.000	0.000	0.000
Area under ROC curve	0.767	0.768	0.770
Sensitivity	74.328	74.785	74.301
Specificity	64.112	63.941	65.273
Cutoff used	0.86	0.86	0.86

NOTES: *Significant at the 10% level **Significant at the 5% level *** Significant at the 1% level. Significance levels are based on linearised robust standard errors. Regressions are estimated using Stata/SE 12.1's *svy: probit* command which executes a probit estimation for complex survey data. The dependent variable is *employment*. The sample includes only working-age graduates in the narrow labour force from the pooled 2004a LFS - 20011QLFSQ4. All regressions include dummy controls for survey period., province, and enrolment at an educational institution. Reference categories are as follows: Race (Black); Gender (Male); Qualification (Bachelor's degree or equivalent); HE Institution (Comprehensive University). The chosen cut-off value for the calculated prediction sensitivity and specificity is equal to the proportion of the estimation sample who are employed.

Table C.7: Historical Status of HEI and Probability of Employment

	(1)	(2)	(3)
Age	0.271***	0.266***	0.267***
Age ²	-0.003***	-0.003***	-0.003***
Coloured	0.284***	0.270***	0.082
Indian	0.004	-0.030	-0.316***
White	0.051**	-0.037	-0.249***
Female	-0.411***	-0.410***	-0.405***
Honours	0.145***	0.133***	0.122***
Masters+	0.293***	0.287***	0.258***
HDI		-0.276***	-0.642***
<i>HDI</i> ×			
... <i>Coloured</i>			0.441*
... <i>Indian</i>			0.774***
... <i>White</i>			1.057***
Constant	-4.261***	-4.049***	-3.859***
Observations	50074	50040	50040
P-value	0.000	0.000	0.000
Area under ROC curve	0.759	0.759	0.760
Sensitivity	72.963	72.898	72.839
Specificity	64.290	64.342	64.590
Cutoff used	0.85	0.85	0.85

NOTES: *Significant at the 10% level **Significant at the 5% level *** Significant at the 1% level. Significance levels are based on linearised robust standard errors. Regressions are estimated using Stata/SE 12.1's *svy: probit* command which executes a probit estimation for complex survey data. The dependent variable is *employment*. The sample includes only working-age graduates in the narrow labour force from the pooled 2000a LFS - 20011QLFSQ4. All regressions include dummy controls for survey period., province, and enrolment at an educational institution. Reference categories are as follows: Race (Black); Gender (Male); Qualification (Bachelor's degree or equivalent); HE Institution Historical Status (Historically Advantaged Institution). The chosen cut-off value for the calculated prediction sensitivity and specificity is equal to the proportion of the estimation sample who are narrowly employed.

Table C.8: Cluster Classification of HEI and Probability of Employment

	(1)	(2)	(3)
Age	0.271***	0.274***	0.271***
Age ²	-0.003***	-0.003***	-0.003***
Coloured	0.284***	0.274***	0.115
Indian	0.004	0.015	-0.197
White	0.051**	0.043	0.333***
Female	-0.411***	-0.405***	-0.410***
Honours	0.145***	0.143***	0.134***
Masters+	0.293***	0.272***	0.265***
Cluster 1 Institution		0.023	-0.359**
Cluster 2 Institution		-0.125	0.156
<i>Cluster 1 Institution</i> ×			
... <i>Coloured</i>			0.539**
... <i>Indian</i>			0.329
... <i>White</i>			0.324*
<i>Cluster 2 Institution</i> ×			
... <i>Coloured</i>			0.126
... <i>Indian</i>			0.184
... <i>White</i>			-0.555***
Constant	-4.261***	-4.253***	-4.284***
Observations	50074	50038	50038
P-value	0.000	0.000	0.000
Area under ROC curve	0.759	0.759	0.762
Sensitivity	72.963	73.013	73.062
Specificity	64.290	64.363	64.520
Cutoff used	0.85	0.85	0.85

NOTES: *Significant at the 10% level **Significant at the 5% level *** Significant at the 1% level. Significance levels are based on linearised robust standard errors. Regressions are estimated using Stata/SE 12.1's *svy: probit* command which executes a probit estimation for complex survey data. The dependent variable is *employment*. The sample includes only working-age graduates in the narrow labour force from the pooled 2000a LFS - 2001QLFSQ4. All regressions include dummy controls for survey period., province, and enrolment at an educational institution. Reference categories are as follows: Race (Black); Gender (Male); Qualification (Bachelor's degree or equivalent); HE Institution Cluster (Cluster 3 Institution). The chosen cut-off value for the calculated prediction sensitivity and specificity is equal to the proportion of the estimation sample who are narrowly employed.