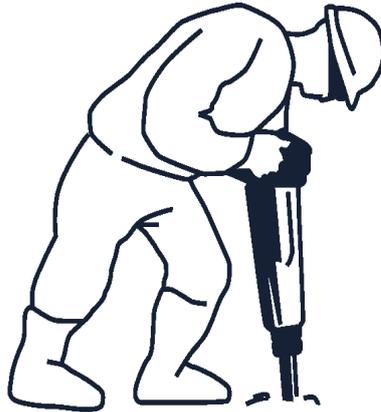


Southern Africa Labour and Development Research Unit



Changes in education, employment and earnings in South Africa – A cohort analysis

by

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Changes in education, employment and earnings in South Africa – A cohort analysis

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Abstract

Rapid increases in educational attainment and the massification of secondary education in South Africa resulted in substantial differences in the supply and quality of educated workers across generations. This paper describes changes in the distribution of education across birth cohorts and how these relate to changes in the probability of employment, the distribution of earnings and the earnings premiums to complete secondary and tertiary education. Tracking cohorts over time allows us to disentangle generational and life-cycle components of these changes. Younger cohorts are shown to have increasingly faced worse labour market conditions than their predecessors, although this may be changing for cohorts born after 1980. Furthermore, the relative reward to complete secondary and tertiary education has remained positive, and increased for tertiary educated cohorts born since the 1960s. Increases in earnings inequality among those with complete secondary education suggests increased variance in education quality during the period when completed secondary education expanded rapidly.

Keywords: Educational attainment, Earnings, Employment, South Africa, Cohort analysis.

JEL codes: I25, I24, J24.

1. Introduction

Secondary education enrolment has expanded rapidly worldwide, and even in poor countries the rate of growth has, for the average country, overtaken primary school expansion (World Bank, 2005). Given the higher costs involved in secondary education, both financial and in terms of human resources, the expansion in access to secondary education raises questions of resource tradeoffs. Development of human capital has the potential to increase the productive capacity of the labour force and hence gross domestic product at the same time as decreasing inequality. Yet fundamental to these successes is the requirement that the education received is of a quality that substantively increases skills/productivity, henceforth referred to as quality education. Thus there is a latent tension between how the quality of education evolves when access to secondary school expands (World Bank, 2005).

“Returns to education provide important information about the incentives for human capital accumulation, the efficiency of resource allocation, and the distributional consequences of differences in human capital” (Zhang, Zhao, Park & Song, 2005: p731) and therefore provide a yardstick against which the investment in secondary school and tertiary education can be measured. Private labour market earnings to a specific level of education reflect a combination of the scarcity of a type of worker, quality of education received and individual worker’s ability. Returns to post-secondary education are high worldwide reflecting the demand for skilled labour in technological centered industries (OECD, 2013). Yet the expansion in secondary and post-secondary education has not brought about a reduction in inequality. In fact, inequality of earnings within groups with higher qualification levels has risen, reflecting higher variability in the quality of education received, higher returns to unobserved characteristics and discussions about ‘over-education’ (Martins and Pereira, 2004).

South Africa presents an interesting case study for this discussion. South Africa has almost universal primary schooling, with most learners continuing far into secondary education. While the World Bank (2005) reports that most countries have dealt effectively with the tension between access to secondary education and quality of learning, this is not the case in South Africa. Due to its racially segregated history, South Africa experienced two periods of secondary school massification– the white population from the 1930s and the African population starting in the mid 1970s – and both periods were accompanied by a reduction in school quality (Crouch & Vinjefold, 2006; Fedderke, De Kadt & Luiz, 2000).

The high level of enrolment in secondary school in South Africa does not reflect the level of learning taking place in schools or the substantial differences in quality of education received across schools. Today, with the expansion of secondary school almost complete, results on international tests in numeracy and literacy continue to reflect the apartheid

legacy of inequality in access and, especially in the quality of education. The level of learning taking place in South African schools is highly variable across schools and is low on average (Spaull, 2013). In fact, South Africa scores well below other nations of similar socioeconomic status and even performs below the levels set out by the school curriculum (Van der Berg, 2009; Department of Education, 2008). In addition, while the expansion of incomplete secondary education has been substantial, the levels of completed secondary education (matriculation) have been far less impressive, partly due to poor preparation in earlier grades making the hurdle of passing the externally set matriculation examination insurmountable. It is therefore interesting to examine how the labour market has responded to these changes in supply and quality of matriculant and tertiary educated graduates.

Substantial unemployment and unequal earnings characterize the South African labour market, with youth disproportionately affected. Youth unemployment levels were estimated at 42% in 2010 (National Treasury, 2011) and have increased over time. Multiple studies show that completing secondary school and tertiary education provides an important advantage in the labour market, improving access to jobs and affording workers higher earnings (see Keswell & Poswell, 2004 for a review; Branson, Leibbrandt & Zuze, 2009; Branson & Leibbrandt, 2013). Tertiary education (especially a degree qualification) has become increasingly valued in the South African labour market widening the gap in employment and earnings for those with tertiary qualifications. Less consensus is evident in the literature with regards to the matriculation premium. There is contention over whether the premium to matriculation has collapsed in recent years as a result of a reduction in the quality of the matriculation certificate (Bhorat, 2004) or remained positive but constant (Branson et al., 2009, Branson & Leibbrandt, 2013).

A fundamental issue in the income inequality literature is the relationship between the distribution of schooling and the distribution of labour market income. Earnings inequality and unemployment are found to be the key components driving income inequality in South Africa (Leibbrandt, Woolard & Woolard, 2007). Branson, Garlick Lam, Leibbrandt (2012) look at changes in the educational distribution and earnings inequality between 1997 and 2007. They show that the large improvements in mean education over the period were not accompanied by rapid declines in earnings inequality. They estimate that, had wage returns to various observable characteristics remained constant over the period, the decline in earnings inequality would have been twice as large as estimated. Changes in returns associated with race and education were found to play the main role in offsetting this decline.

The aim of this paper is to look at changes in the distribution of education across birth cohorts and how this relates to changes in the distribution of inequality in employment, earnings and the returns to education in South Africa. The primary contribution of the paper

is the focus on birth cohorts as the lens of observation.¹ A number of papers have analysed changes in earnings, employment, inequality and returns over time for the South African labour force as a whole (Burger & Yu, 2007; Casale & Posel, 2002; Banerjee, Galiani, Levinsohn, McLaren & Woolard, 2008; Branson et al., 2012 and others) but observing the experience of cohorts adds a different dimension. We track birth cohorts of South Africans born between 1944 and 1985 from a series of 17 successive national household surveys spanning from 1994 to 2010. This allows us to disentangle generational and life-cycle components for individuals with similar levels of education. Cohorts present a meaningful unit to analyse the South African labour market. Individuals born in the same year (birth cohort) were subject to the same educational structures and hence quality of education. Similarly individuals in the same birth cohort experience similar macroeconomic and labour market conditions. Thus analyzing cohorts with the same level of education allows us to control for changes in the supply of workers with a specific education level something which cross sectional analyses fail to take into account.

Our research is also timely and relevant to the ongoing debate on youth unemployment in South Africa. Questions of the source of unemployment, the characteristics of the unemployed and how best to address these issues are at the forefront of policy debate. The cohort lens enables us to disentangle the generational from the life cycle components and focus on how the labour market experience of youth has changed over time. Employment, earnings and even measures of inequality have strong life cycle components. Youth unemployment and the impact of youth unemployment on labour market trajectories can therefore be assessed independently of age profiles.

We show that younger cohorts have increasingly faced worse labour market conditions than their predecessors, but that this may be changing for cohorts born after 1980 with matriculation and tertiary education. In addition, the relative reward to matriculation and tertiary education has remained positive, and has increased for tertiary educated cohorts born since the 1960s. While many of the shifts appear consistent with changes in the supply of educated workers, a fall in quality experienced during periods of secondary school expansion is impacting too. Increases in earnings inequality within education categories and especially matric, further substantiate the role played by changes in education quality.

The rest of the paper is organized as follows. Section 2 describes the data and decomposition methodology used. The analysis is presented in Section 3. Section 4 presents a discussion of our results in the context of debates over the education quality and youth unemployment within South Africa.

¹ This is not the first study that examines the South African labour market from a cohort lens. Grun (2004) used a similar approach to describe earnings in South Africa using 1995 to 1997 data and Branson & Wittenberg (2007) and Burger & von Fintel (2009) examined labour market access using 1994-2007 data. Both Grun and Burger & von Fintel focused on racial differences while Branson & Wittenberg restricted the sample to Africans only.

2. Data and decomposition methodology

The absence of long-running national panel data in South Africa means it is not possible to track individuals over their lifetimes. South Africa does however have a wealth of national cross sectional household surveys that provide us with the opportunity to follow groups of individuals defined by their date of birth. The average characteristics of birth cohorts can therefore be analysed over time. In addition, decomposition of average characteristics into age, cohort and year effects enables us to disentangle the generational and life-cycle components of change.

We make use of a series of 17 years 1994-2010 of cross sectional household survey data. The data comprise the annual October Household Surveys (OHSs) in the 1990s, the biannual Labour Force Surveys (LFSs) between 2000 and 2007 and General Household Surveys (GHS) between 2008 and 2010. The OHS, LFS and GHS surveys collected information on a variety of topics including education and labour market variables and therefore present the opportunity to analyse changes in education and labour market inequality by birth cohorts over time. Datafirst has constructed a series called the Post Apartheid Labour Market Series (PALMS) containing the OHS 1994-1999 and LFS 2000-2007 data. Careful attention was taken to ensure consistent variable definitions across the surveys (Kerr & Lam, 2012). PALMS includes survey weights that produce consistent population estimates over time (Branson & Wittenberg, 2013). We augment these data with comparable variables and survey weights from the GHS 2008-2010 data.

Our analysis focuses on changes in the distribution of education, probability of employment, earnings and education premiums across generations within education categories (particularly matriculation and tertiary education). We restrict the data to adult males aged 25 to 50 in each survey year, pool the surveys and construct birth cohorts as the difference between survey year and age. As a result our analysis is on cohorts born between 1944 and 1985. We group these birth years into three-year categories to ensure large enough samples in each age-cohort cell.

Table 1 presents sample sizes and weighted mean values on the crucial variables in the analyses by birth cohort category. From column 2 it is evident that the more recent cohorts are, on average, much younger than the older cohorts. From the middle panel of the table we see how educational attainment has changed over five decades, with younger cohorts having larger proportions of post primary education graduates than their predecessors. The right panel shows a rapid increase in unemployment and a decline in real monthly earnings for more recent birth cohorts. The difference in mean age across the cohorts, however, makes it unclear how much of this increase in unemployment is a function of changes across generations, and how much is a function of the fact that younger people are less likely to be employed. Ideally we would want to follow each cohort over the complete age spectrum

(25-50). Our data span only 17 years and we therefore do not observe each cohort at each age. We observed earlier cohorts at, on average, older ages, and more recent cohorts at, on average, younger ages.

Table A1 in the appendix illustrates this point. The percentage with a completed tertiary education is presented for each age group and year group. The diagonal elements represent the cohorts tracked. The longest any specific cohort is observed is seventeen years. Cohorts born between 1950 and 1970 are each observed for a 17 year period. Pre 1950 and post 1970 cohorts are observed over shorter periods. For example, the 1977-1979 cohort is only observed between the ages of 25 and 33 and the cohort born between 1944-1946 is only observed between ages 48 and 50.

We decompose trends in the probability of employment, log real earnings, earnings inequality as measured by the Gini coefficient and matriculation and tertiary education premiums into age (life cycle), cohort (generational) and year effects. The core assumption when using birth cohorts to observe generational changes over time is that the group defined by date of birth remains fairly constant across surveys. This assumption is vulnerable to selective migration and death and, in our analysis, changes in educational attainment. Given that migration and death are correlated with socioeconomic status and education, the fact that we look within education category will to some extent mitigate bias due to selective migration and death. In addition, our choice of sample age, 25-50, will limit the changes in educational attainment over time as most people² have completed their education by the age of 25 and reduce the impact of old age deaths.

The size of the cohort sample at each age is also crucial for the precision of our estimates. We collapse our data into three-year groupings to maximize age-cohort cell size. Table A2 in the Appendix presents the sample sizes by age-year-category cell for the tertiary educated, the education group most vulnerable to small sample size. Samples exceed the common cutoff of ten in each cell (Verbeek & Nijman, 1992). Sample cell sizes for the matriculation group are larger than those presented for the tertiary educated.

Using the case of earnings to illustrate, the logarithm of earnings can be modeled as

$$\ln y_{ct} = \beta + \alpha_{ct} + \gamma_c + \varphi_t + \mu_{ct} \quad (1)$$

where subscripts c and t refer to cohort and time and α refers to age, defined as the age of birth cohort c in year t. To implement this decomposition empirically requires that we solve an identification problem. This is illustrated by rewriting model (1) in matrix form as

$$Y = Xb \quad (2)$$

² Only 2.6% of males between 25-50 were enrolled in education in 2010 (Statistics South Africa GHS, 2010).

where b is a vector containing the intercept, age, year and cohort coefficients. Since cohort is a linear function of year and age, equation 2 is perfectly collinear. The linear relationship between the age, period and cohort variables translates to a design matrix, X , that is one less than full column rank implying that $X^T X$ is singular and its inverse does not exist (Deaton, 1997). It follows that there is no unique solution and that the model cannot be identified without additional identifying assumptions.

Methods used in the literature to identify a unique solution to this problem include constraining two or more coefficients to be equal, using a proxy variable or information about the macroeconomic context to replace or constrain the age, year or cohort effect and using a non-linear parameterization of the model (Deaton, 1997; Yang, Schulhofer-Wohl, Fu & Land, 2008). Each approach has its own advantages and limitations (See Yang et al., 2008 for details) but the primary concern with these methods is that the researcher is required to make an assumption that may be arbitrary and empirically restrictive.

We use the Intrinsic Estimator (IE) method presented by Yang et al. (2008) as a means to identify the parameters in our regressions. The IE method finds a solution to the identification problem by recognizing that the design matrix should have no influence on the coefficient estimates since it is fixed once the number of age and year groups are defined and is not related to the outcome of interest (Yang et al., 2008). In this way a unique solution to model (2), with desirable statistical properties, can be found with minimal assumptions. Note that the results in our analysis were replicated using the Deaton and Paxson (1994) identifying assumptions and were found to be substantively similar although trends were more extreme. We chose the IE results over the Deaton and Paxson results as the assumption that year effects sum to zero across years did not appear plausible in our context.³

The methodology presented below is paraphrased from Yang et al. (2008). The exact linear dependency between age, period, and cohort variables can be mathematically expressed as:

$$XB_0 = 0 \quad (3)$$

where B_0 is the normalized eigenvector of the singular design matrix X corresponding to the unique eigenvalue 0. B_0 is a function of the number of age groups and year groups only and is therefore independent of the outcome variable. As such it does not determine the estimated coefficients and can be isolated. Vector b of model (2) can therefore be decomposed into two parts that are orthogonal to one another:

³ See, for example, the earnings year effects panel for the tertiary educated in Figure 4. Constraining this trend to sum to zero over the period observed would require that the continual increase in year effects from 1997 onwards would not be possible.

$$b = b_0 + t B_0$$

where t is a real number and, tB_0 is a vector such that $tXB_0=0$ (Yang et al., 2008). The parameter vector b_0 corresponding to $t = 0$ satisfies the geometric projection:

$$b_0 = (I - B_0 B_0^T) b$$

Or

$$b_0 = P_{proj} b$$

b_0 is the parameter vector that the IE estimates.

The decomposition of parameter vector b means that each solution, \hat{b} , to equation (2), can be written as a linear combination:

$$\begin{aligned} X\hat{b} &= X(B + tB_0) = XB + tXB_0 \\ X\hat{b} &= XB + 0 = XB \end{aligned}$$

where B is the solution that estimates b_0 .

We use Yang et al.'s (2008) IE estimator to solve OLS regression as set out in equation (1) for outcomes of real earnings, employment probability, Gini coefficients and matriculation and tertiary education premiums. Importantly, the decomposition technique ignores interactions between age, years and cohorts and therefore assumes that the age profile is unchanged across generations and over time. In each case, the age, cohort and year coefficients and their confidence bands are displayed in a graphical representation. Decompositions are done separately within each of the four education categories – primary, incomplete secondary, matriculation and tertiary educated, but only the results of the matriculation and tertiary educated groups are shown.

3. Analysis

In this section we describe patterns of change in educational attainment, employment, earnings and inequality across generations in South Africa. Changes are described separately for each dimension but together begin to describe a coherent story of changes in the labour market experience of different generations.

3.1 Changes in educational attainment

We start by examining the supply of educated labour across generations. Figure 1 presents cumulative distributions of schooling for selective birth cohorts separately for Africans and whites. The cumulative distributions provide a detailed summary of the change in educational attainment across the full distribution of years of schooling. A noticeable feature of Figure 1 is the large persistent racial differences in schooling for each birth cohort. Even within the youngest cohort, those born in 1980-1982, whites have more years of education than their African counterparts. Important to this analysis is the clear improvement in educational attainment between generations of Africans, with most rapid improvement for generations educated before the end of apartheid⁴. Less than 10% of Africans born in 1944-1946 obtained 11 or more years of education. This increased to 50% of Africans born between 1980 and 1982. While most of the shift in the distribution is at education levels below grade 12, school completion rates increased as well. This was especially true between the 50s and late 60s birth cohorts and slowed for the later two cohorts. For whites, improvements are seen between the first three cohorts, in other words for cohorts born until the 1970s, with progress partially reversed in the youngest cohort.

Figure 2 shows the distribution of educational attainment classified into no schooling, primary, incomplete secondary and tertiary, by birth cohort.⁵ Figure 2 confirms the rapid expansion of secondary education across generations (both incomplete secondary and matric) illustrated in Figure 1. Figure 2 highlights two additional points not made clear in Figure 1. First, while the proportion of matriculants grew rapidly for cohorts born until the mid 1970s, the proportion of matriculants in subsequent cohorts has remained remarkably constant. Second, the proportion continuing on to complete a tertiary qualification is very stable between birth cohorts, even during the period of rapidly increasing matriculation. As a result, the percentage of matriculants continuing on to tertiary declined from about 40 percent of the 1944-1946 cohort to around 18 percent of the 1983-1985 cohort.

Results from both international and local standardised tests illustrate that educational attainment figures exaggerate the actual level of learning in the majority of South African schools (Van der Berg, 2009). These test results are for recent cohorts, yet the data suggest that the quality of learning deteriorated with the expansion of secondary school. Malherbe (1977) notes how the composition of subjects changed to accommodate less able learners and alleviate the high repetition rate among white learners starting in the 1930s. For

⁴ Only cohorts born after 1976 would have experienced any of their education after the end of apartheid.

⁵ Note that the distinction between primary and incomplete secondary education is based on current classification - primary is grade 1 to 7 and secondary is grade 8-12 with grade 12 equivalent to matric. Prior to the 1950s, the dividing line between primary and secondary education was the completion of grade 8 (standard 6) (Malherbe, 1977). The classification of tertiary education includes any post-matriculation qualification.

example, the number of matriculants taking mathematics fell dramatically during the rise of the white matriculation rate over this period (Fedderke et al., 2000). Moll (1992) illustrates how African education was negatively affected by the civil unrest after the Soweto shootings and the death of Steve Biko. The percentage of African standard 8 first class passes⁶ dropped from 15% in 1975 to two percent in 1980 and the percentage of African matriculants who took mathematics and passed with an exemption fell from 19% in 1975 to 8% in 1980. The decline in the pool of matriculants completing a tertiary qualification, evident in Figure 2, is consistent with a decline in the quality of learning among matriculants. Thus in addition to changes in the distribution of educational attainment, the quality of learning received by different generations has changed over time.

We control for the change in the supply of a specific level of education by presenting analyses separately for matriculants and those with a tertiary education qualification. In the analysis that follows we are interested in changes in labour market rewards to matriculation and tertiary education as well as changes in the variance of earnings across generations with the same qualification level.

3.2 Labour market outcomes – employment, earnings and inequality

Figure 3 presents average real log monthly earnings for a selection of birth cohorts observed from 1994 through to 2010. Matriculants are presented in the left-hand panel and those with tertiary education in the right-hand panel. As an illustration, examine the cohort born in 1968-1970 who completed matriculation (left-hand panel). The first point on this line represents the average real log earnings of this cohort when they were 25. Given that individuals born in 1969 were 25 in 1994 and those born in 1970 were 25 in 1995, the average earnings for this cohort at age 25 is calculated from data in the 1994 and 1995 surveys. The second point on the same line segment represents the cohort born in 1968-70 at age 26. This estimate is calculated from data in the 1994-96 surveys. Each subsequent point on this line represents the average earnings of the 1968-1970 cohort at the next age calculated from subsequent surveys. In this way the cohort born in 1968-1970 is tracked through 18 points until they are last observed at age 42 in the 2010 survey. Similar estimates of mean log real earnings by age are presented for those with tertiary education in the right-hand panel.

Figure 3 illustrates two points. First, earnings increase with age for both education groups. Second, while the trajectories for the tertiary educated cohorts overlap significantly, when we compare different cohorts of matriculants observed at the same age, the lines for the more recent cohorts are, almost always, below the lines for the older cohorts. Figure 3 however, illustrates a combination of age, cohort and year effects in earnings. It is

⁶ Standard 8 is equivalent to grade 10 and a first class pass required a minimum of 60% in the Junior certificate (Moll, 1992).

important, therefore, for us to decompose earnings as described in section 2 into cohort, age and year effects.

Figure 4 presents the decomposition of log earnings for matriculants and those with tertiary education. The life cycle profile of earnings is clearly illustrated in the middle panel of Figure 4: earnings increase with age. The year effects panel shows continuous increases in log earnings among those with tertiary education from 1997 onwards, with earnings for matriculants first decreasing until 2006 before increasing thereafter. The cohort effects plotted in the left panel of Figure 4 show that, given age, younger generations of matriculants earn less in real terms than older generations. Real earnings fell particularly strongly for cohorts born between the early 1960s and 1975, the cohorts that would have been in secondary school during the unrest of the 1980s. Far less change is apparent across cohorts with tertiary education. While the real tertiary earnings of younger cohorts born between 1944 and 1965 declined, the earnings of subsequent cohorts have been stable.

The above analysis of earnings was conditional on having a job. With the growing unemployment problem in South Africa it is very important to augment this analysis with an analysis of employment and the role of education in acquiring employment. Figure 5 presents a similar decomposition of employment for matriculated and tertiary educated males. Again there is a plausible age profile to finding employment with strong increases in employment probability in the twenties, which stabilize thereafter. In the cohort panel we see that for a given age, the employment prospects of younger cohorts of matriculants born between 1950 and 1974 decreased continuously. Cohorts born in 1974-1976 were about 10 percentage points less likely to find employment at a given age than the cohort born in 1950-1952. This however appears to be changing. Cohorts born in 1983-1985 who obtained matriculation were more likely to find employment given age, than their counterparts in 1974-1976. For those with tertiary education, the probability of employment given age remained fairly constant for those born between 1944 and 1964. Cohorts born between 1965 and 1976 experienced decreasing probability of employment, but employment prospects improved for cohorts born thereafter. As such cohorts born in 1983-1985 have a similar odds of employment given age, to those born in the 1950s.

To recap, Figures 4 and 5 show that younger cohorts of matriculants born between 1950 and mid 1970 had continuously deteriorating earnings and employment outcomes. Cohorts born thereafter have seen improvements. Figure 2 showed that matriculation completion rose significantly for cohorts born between 1950 and 1974, and remained constant thereafter. Twelve percent of 25-50 year olds born in 1950-1952 had matriculation compared to over 30 percent of those born in 1974-1976. On the other hand, the proportion with tertiary remained fairly constant over the period, as did the labour market outcomes across cohorts of tertiary education individuals.

However, it is important to bare in mind that changes in the supply of the quantity of education embodied in workers is only part of the story. Another part of the decline in employment and earnings among younger cohorts of matriculants might be attributed to declines in the quality of given quantities of education. It is clear from Figure 2 that although the number of matriculants rose substantially between the 1950 and 1974 cohorts, the proportion continuing on to tertiary education remained constant even in an environment of high tertiary labour market returns. In addition, it is not clear from Figure 2 why the employment prospects of tertiary educated males decreased for cohorts born between the mid 60s and 70s. Changes in demand for a specific type of tertiary education and quality of education within education type are therefore other parts of the story.

Describing the pattern of earnings inequality across generations with matriculation and tertiary education sheds some light on this. Birth cohorts are educated under similar education systems. Thus changes in inequality between cohorts with the same level of education may speak to quality differences or at least differences in the labour market's perception of the quality of skill being provided by a cohort of individuals with the same level of education. The first point to note is that the mean level of earnings inequality measured on positive earnings is similar for the matriculated and tertiary educated groups. Figure 6 shows a Gini coefficient of 0.5 in both the matriculation and tertiary educated groups averaged across all ages and cohorts. However, the inclusion of the unemployed as zero earners increases inequality among matriculants significantly with little impact on inequality levels among the tertiary educated, reflecting the difference in employment probabilities for these qualifications.

Figure 7 presents the cohort effects from the decomposition of the earnings Gini into age, cohort and year effects, for the matriculation and tertiary education groups. The top panels present traditional Gini coefficients calculated on positive earnings. The bottom panels include the unemployed as zero earners. Inequality in earnings among matriculants declined for cohorts born between the mid 40s and mid 60s, but has risen for cohorts born thereafter. In fact the level of inequality in earnings for those born in the 1983-85 cohort is similar to those born in the mid 1940s, with the inequality among the cohort born in the mid 1960s 15 percentage points lower. The pattern among those with tertiary is far less distinct. While inequality dropped rapidly for tertiary education cohorts born in the late 40s early 50s, inequality has remained fairly constant across cohorts since then. Including the unemployed accentuates changes in inequality for the matriculants, with no discernable impact on the tertiary educated trend. This reflects the growing problem of unemployment among younger cohorts of matriculants.

The rise in inequality for matriculation cohorts born since the mid 60s coincides with the massification of completed secondary education over this period. This pattern of rising inequality in the era of rapidly increasing matriculation is consistent with a story of

decreasing quality of education. Thus while the decline in earnings and employment observed in figures 3 and 4 is consistent with a story of increases in the supply of matriculants, part of this decline must be a result of decreases in quality. The story appears even more consistent for those with tertiary education. No increase in tertiary educated graduates accompanied the decline (albeit marginal) in earnings and employment for cohorts born in the 70s. Yet the decline in earnings and employment for these cohorts aligns with the increase in inequality for cohorts born in this period. While matriculation is a standardised exam, tertiary education is defined in this analysis as any post matriculation qualification. Thus it is possible that the increase in inequality and the decrease in earnings and employment are a result of changes in the types of qualifications attained by cohorts born since 1970s, with increases in qualifications in skills less valued by the labour market.

3.3 The premium for matriculation and tertiary education

Having shown deteriorating labour market conditions and rising inequality among successively younger cohorts, we now go on to explore changes in the relative reward to matriculation and tertiary education. We saw in Figures 4 and 5 that the absolute return to matriculation has declined substantially for younger cohorts both in terms of employment and earnings and that while younger cohorts with tertiary education were protected from declining earnings, those tertiary educated cohorts born between 1962 and 1974 experienced declining employment prospects. Yet, differences in the starting point, and rate of decline in labour market conditions between the education categories, mean that these figures cannot inform us about the relative reward to matriculation and tertiary education.

Figures 8 and 9 presents the ratios of average earnings and employment probabilities between those with matriculation versus those with grade 10 or 11 (in the left hand panel) and between those with some level of tertiary education versus matriculation (in the right hand panel) for selected cohorts by age. We refer to these as, respectively, the matriculation and tertiary education premiums. The first point to notice is that both the employment and earnings premiums are greater than one for all cohorts at each age. At age 25, matriculants born between 1974 and 1976, those shown to fare particularly poorly in the labour market, earned 40 percent more and were 25 percent more likely to be employed than respondents with grade 10 or 11 born in the same cohort. Thus although the absolute earnings of younger cohorts of matriculants have fallen, matriculants continue to be positively rewarded relative to grade 10 and 11s in the labour market. Within the youngest birth cohort, the average person with tertiary earns between 2 and 3 times the wage of a matriculant and is up to 20 percent more likely to find employment, depending on age. It is also apparent, that at each age, younger cohorts of tertiary educated respondents have a higher premium than their predecessors, signaling that the premiums to tertiary education relative to matriculation have increased across generations.

Figure 10 presents the cohort effects from the decompositions of the matriculation and tertiary education premiums. The matriculation earnings and employment premiums have remained remarkably stable across the cohorts. On the other hand, tertiary education is highly valued from the outset and this has increased over the cohorts. The earnings premiums to tertiary education rose particularly rapidly for cohorts born post 1962. The increase in the employment premium for tertiary education was more marginal, but has been rising continuously since the early 50s.

4. Discussion and conclusion

We have used the lens of the birth cohort to describe changes in employment, earnings, inequality and the matriculation and tertiary premiums between generations of South Africans with similar levels of education. Employment and earnings have strong life cycle components and thus this lens allows us to disentangle the generational components of changes in the labour market variables from the life cycle components. In addition, grouping our analysis by education level controls for shifts in educational attainment and quality of education across generations. The decompositions are mere descriptions of age, year and cohort changes and we therefore make no attempt to isolate the determinants of these changes. Despite this, the different dimensions of education together with the labour market outcomes begin to piece together a probable and coherent story.

Employment probabilities and earnings for matriculants are shown to have decreased for younger cohorts between 1950 and 1975, with particularly sharp declines in earnings among matriculants born after 1960. This deterioration in labour market outcomes across generations is consistent with the increase in the supply of matriculants since the 1950s. In addition, we saw that earnings inequality rose for those cohorts where the share of matriculants was increasing, signaling that the deteriorating labour market outcomes are also consistent with a decrease in the quality of the matriculation certificate during this time. These deteriorating outcomes for younger cohorts appear to be changing. Cohorts of matriculants born since the 1980s have improved odds of employment compared to cohorts born in the mid 1970s.

This deterioration in the labour market outcomes of matriculants until those born in 1980 should not be confused with a negative valuation of the matriculation certificate relative to lesser years of education. The market continues to value the matriculation certificate. While the relative earnings of matriculants compared to the earnings of those with grade 10 or 11 has remained stable, this premium is positive. Similarly, matriculation still increases the chance of employment and this premium has remained fairly constant across cohorts.

These two trends are useful in reconciling a controversy over changes in the prospects of matriculants. Absolute earnings and employment probabilities of matriculants fell significantly for cohorts born between the 1950s and mid 1970s. It is these facts that have driven the argument that South Africa faces a crisis of unemployed matriculants and that the matriculating is worthless. This latter claim is demonstrably incorrect. The premium to matriculation has remained positive; matriculants are still positively rewarded relative to lower education levels in the South African labour market.

Within tertiary education, the supply of tertiary remained fairly stable across birth cohorts during a time when shortages of tertiary skills are documented (Bhorat, 2004). A decrease in employment probability was only seen for cohorts born between 1965 and 1975, in other words, it was a very localized decline and appears to be associated with shifts in the type of tertiary education available within these cohorts. Indeed the tertiary education sector expanded substantially between 1990 and 1994, the period when 1965-1975 cohorts would have been studying. Historically black and white universities expanded by 37% and 8% respectively (Jansen, 2004). During this time humanities' (arguably less valuable in a skill intense economy) enrolments increased to 50% of all university enrolments, which represent two thirds of the higher education sector. It is therefore possible that the decline in employment probability for these cohorts was a response to changes in the type of tertiary education supplied. This is supported by the fact that tertiary cohorts born post 1975, who would have received their tertiary education in the late 1990s, no longer experienced deteriorating probabilities of employment. The late 1990s was a period when the tertiary education sector experienced some significant changes. Participation of black students in higher education increased by 80% during this period, improving the racial distribution of higher education institutions significantly (Jansen, 2004). This period also saw a substantial decline in the share of students studying humanities (Jansen, 2004).

The increase in the tertiary premium despite the fairly stable levels of real earnings across generations confirms findings by Branson et al. (2012) that South Africa has experienced a skills twist with the relative increase in demand for tertiary education reflected in the growing difference in earnings between tertiary education and matriculation for younger cohorts. The steady increase in employment for cohorts born since the 1950s adds further credence to this argument. In addition, the rise in the premium to tertiary education relative to matriculation possibly adds further evidence of the quality problems associated with the matriculation certificate.

This compilation of evidence begins to describe patterns that have emerged in an environment where the tension between increasing access to education and the quality of education is a reality. Together each dimension adds to the discussion of changes in labour market experiences of generations educated under different systems and presents evidence of how the labour market responds to the supply and quality of labour. With very low

returns to all education below completed secondary schooling, young South Africans have no choice but to strive to complete secondary schooling. Even though the earnings of matriculants have been declining, the returns to completing matriculation are still positive, signaling that their earnings are markedly higher than the earnings of those with lower levels of education. In addition, this is the route to tertiary education, in which the relative returns are higher than ever for today's youth. Increasing inequality in the returns to all secondary schooling, including matriculation, provide evidence of adjustments from the demand side of the labour market to concern over the quality of education. It is sobering to note that the extension of educational access has had similar effects internationally. As has been the case internationally this makes it imperative that the extension of educational access is accompanied by better alignments of educational output to skills demanded in the labour market.

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Tables and Figures

Table 1: Mean characteristics on pooled data by birth cohort category

Birth cohort	N	Average Age Across Surveys	African	Primary	Incomplete secondary	Matric	Tertiary	Economically Active	Employed	Unemployed	Real earnings (1994 rands)
1983-85	4764	25.6	82.5	13.3	42.3	34.6	9.8	94.2	61.0	39.0	1736.4
1980-82	15860	26.6	81.7	14.4	42.5	33.4	9.6	93.4	63.9	36.1	1660.4
1977-79	26856	27.9	82.2	16.5	40.4	33.7	9.4	93.8	63.3	36.7	1786.6
1974-76	39373	29.3	80.7	18.7	37.6	33.2	10.5	93.7	66.6	33.4	1837.2
1971-73	42938	31.3	77.1	21.7	35.8	31.1	11.5	93.3	71.1	28.9	2496.8
1968-70	47750	33.3	75.4	26.3	34.7	26.3	12.7	92.6	75.2	24.8	2412.4
1965-67	42796	36.2	73.8	30.4	34.0	23.3	12.4	92.8	78.0	22.0	2562.5
1962-64	43224	39.1	73.6	35.6	33.6	18.8	12.0	92.3	79.5	20.5	2598.8
1959-61	38890	42.0	71.1	38.2	32.5	17.2	12.2	91.6	80.3	19.7	2914.4
1956-58	31770	44.2	71.1	41.8	32.2	15.0	11.0	90.1	80.4	19.6	2910.2
1953-55	21837	45.7	70.2	45.2	31.3	13.3	10.2	89.5	81.8	18.2	2943.1
1950-52	13443	47.0	69.1	48.0	29.3	12.8	9.9	88.5	82.3	17.7	2951.5
1947-49	6517	48.0	66.8	46.2	31.7	12.0	10.1	86.3	82.9	17.1	3706.4
1944-46	2907	49.4	64.4	43.1	35.0	13.0	8.8	86.3	85.9	14.1	4168.5

Notes to Table 1: The table presents sample sizes and mean values for key variables in the analysis by birth cohort category. These are average values across all surveys in which the birth cohort features. Hence age represents the average age of the cohort group across the survey years. Data source: PALMS data augmented with GHS 2008, 2009 and 2010 data. Sample is males 25-50. Means weighted using the cross entropy weight supplied in the data.

Figure 1: Cumulative distributions of educational attainment for selected African and white male cohorts

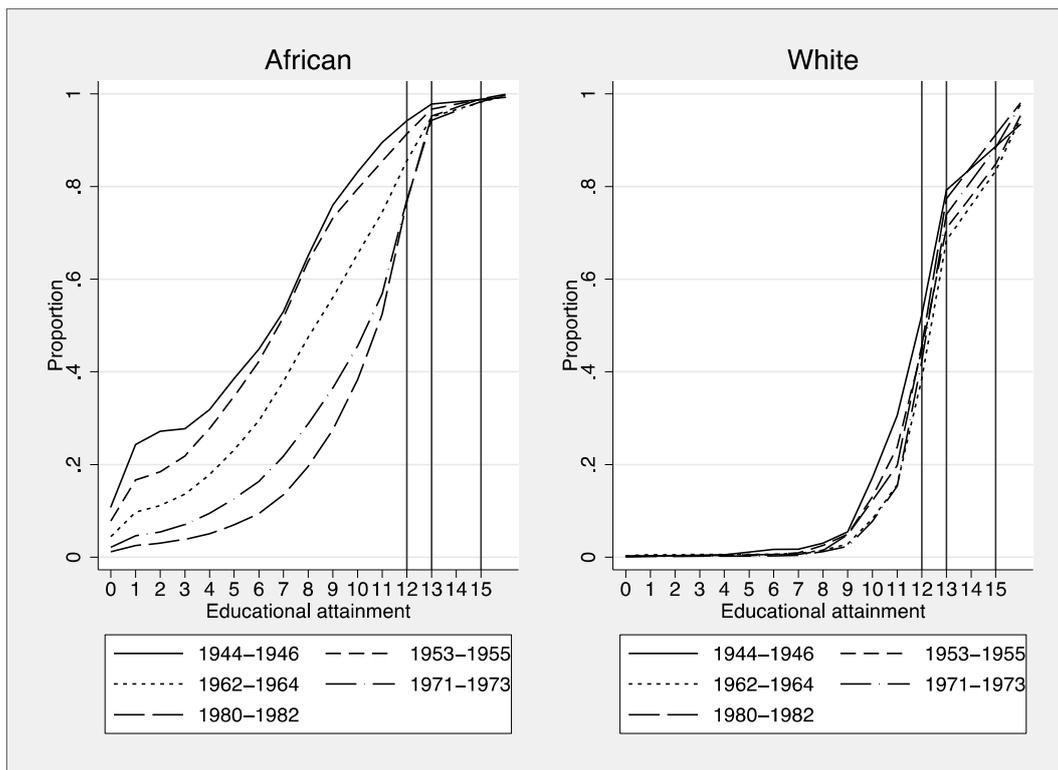
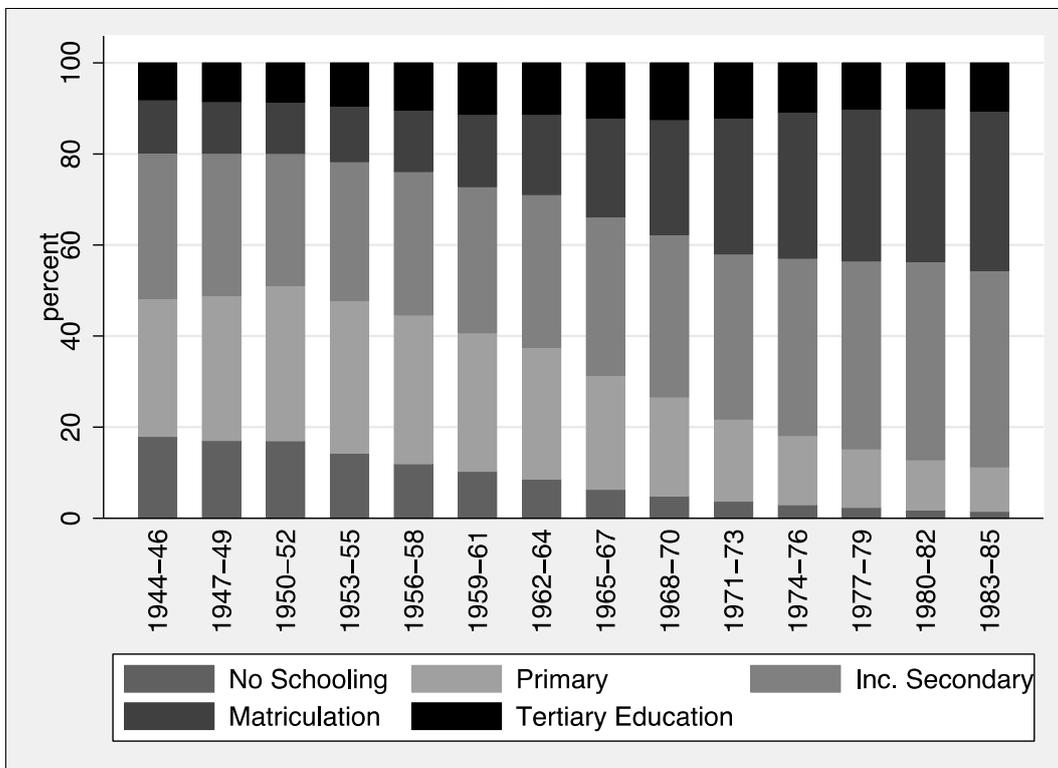


Figure 2: Distribution of educational attainment by birth cohort category, adult males 25-50



Notes to Figure 2: Each bar represents a three year birth category. Education category classification based on highest completed education. No schooling represents no completed schooling, primary is grade 1 to 7, incomplete secondary is grade 8-11, grade 12 is matriculation and tertiary education includes any post-matriculation qualification.

Figure 3 – Average earnings for selected birth cohorts by age for matriculants and those with tertiary education

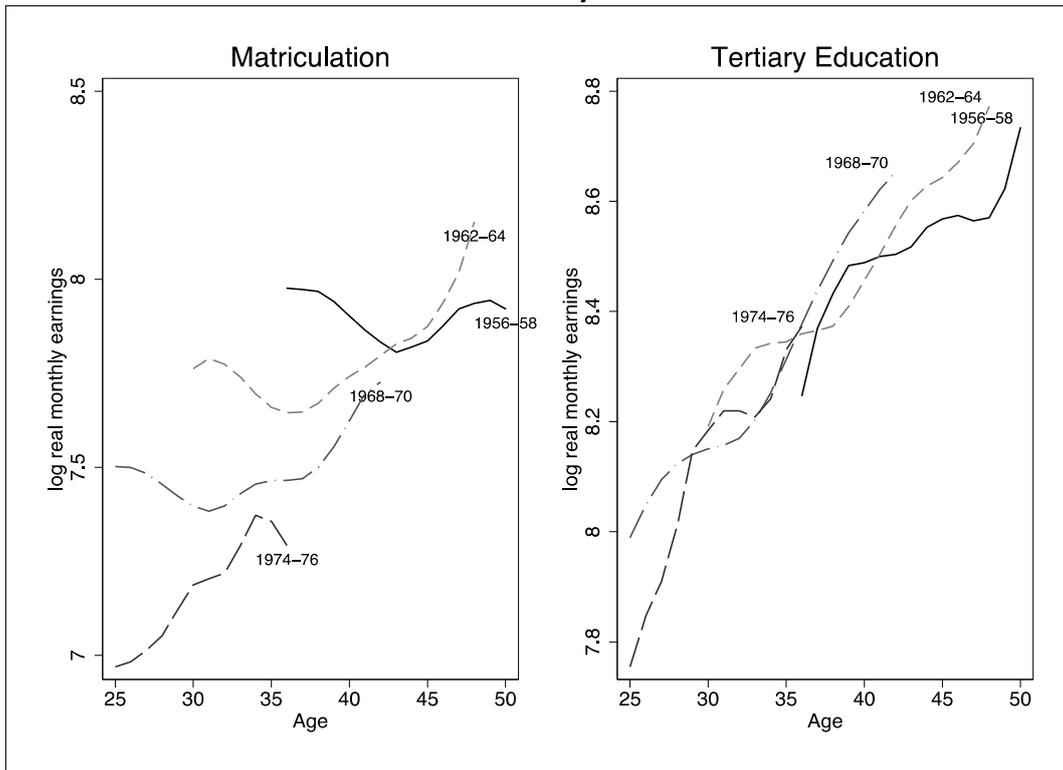


Figure 4: Earnings age, year and cohort effects for those with matriculation or tertiary education

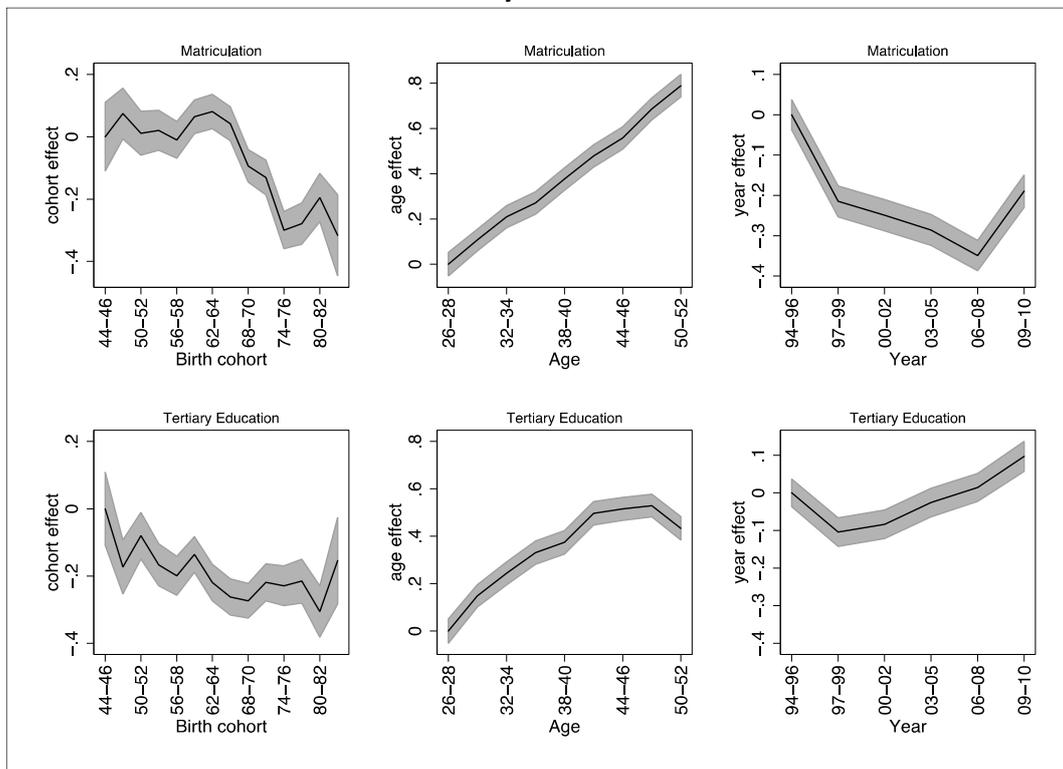


Figure 5: Employment age, year and birth cohort effects for those with matriculation and tertiary education

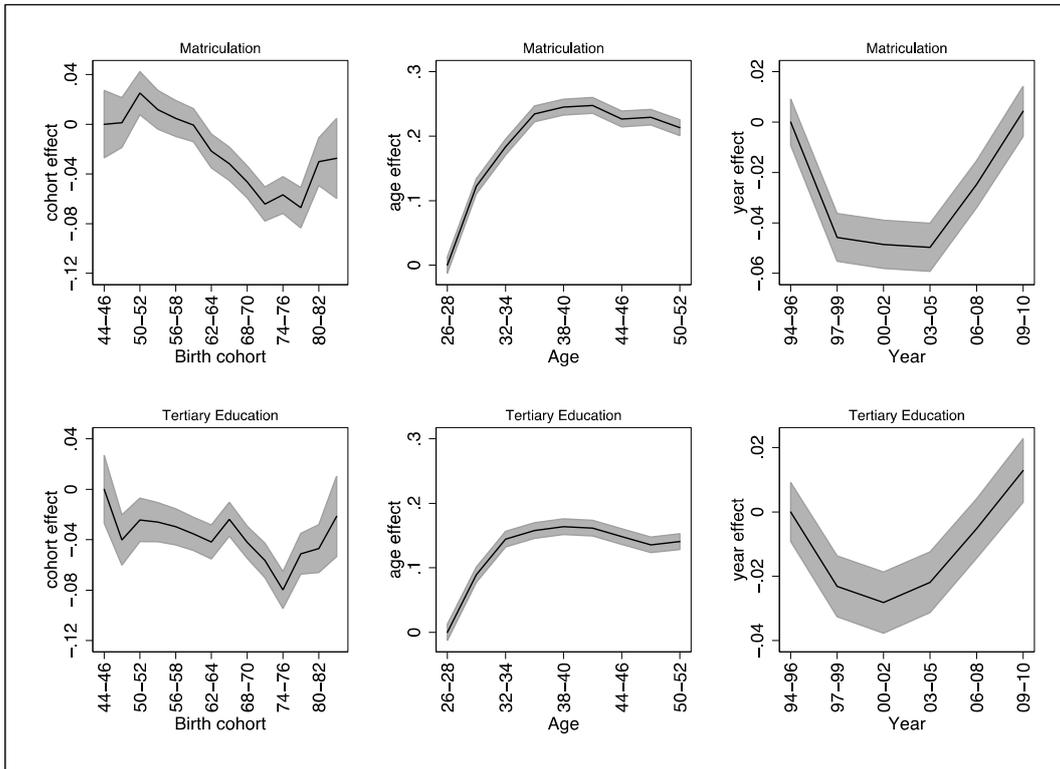
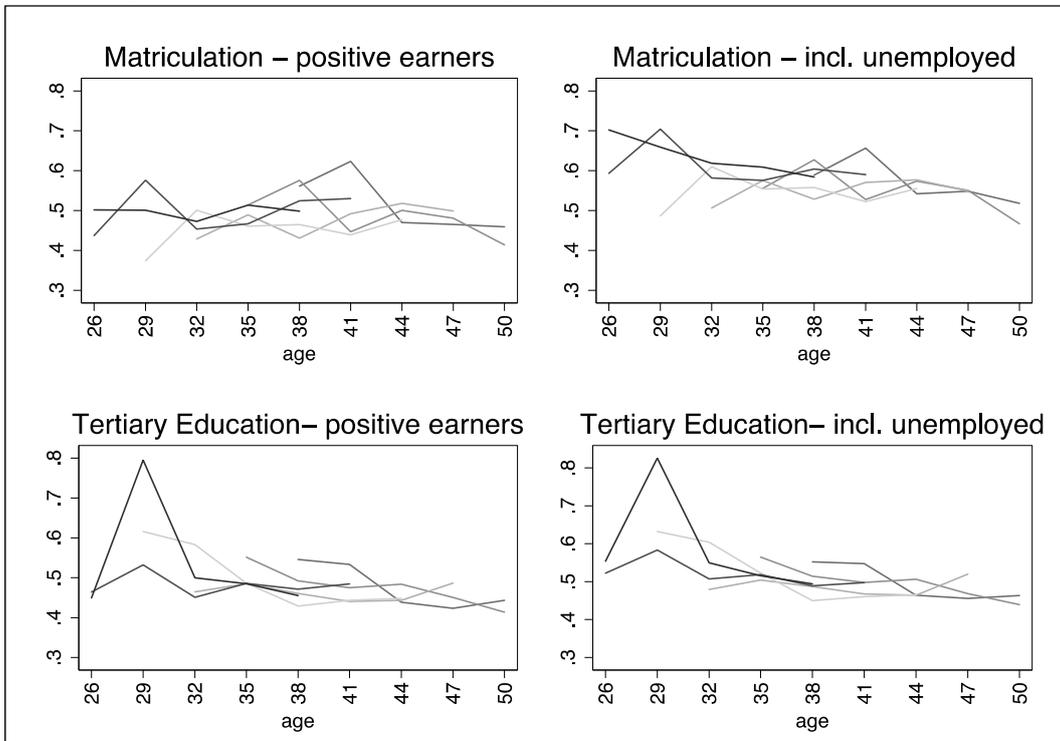


Figure 6: Gini coefficients by age group for different birth cohorts



Notes to figure: average for the cohort category, and age category, gini coefficients calculated within three-year age category and year category group for birth cohorts between 1983 and 1935. Given the overlap between the different birth cohorts, the legend is excluded for simplification purposes. Lines to the left of each figure represent younger cohorts.

Figure 7: Gini coefficients for earnings – including and excluding the unemployed – for those with matriculation and tertiary education

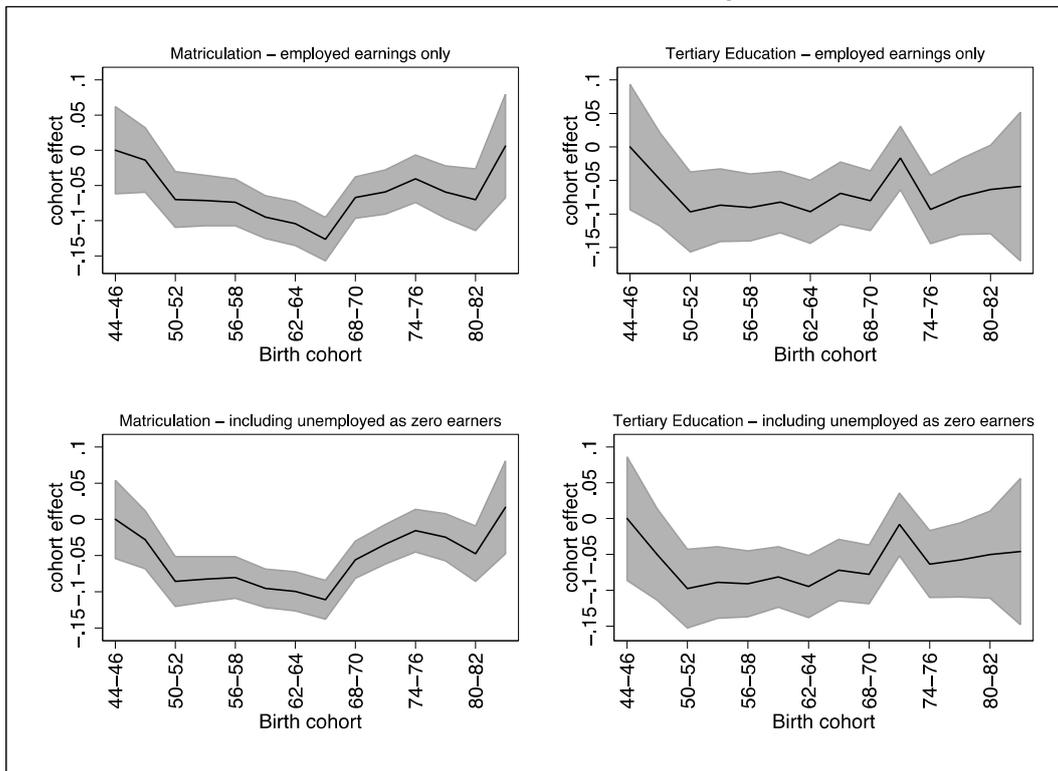
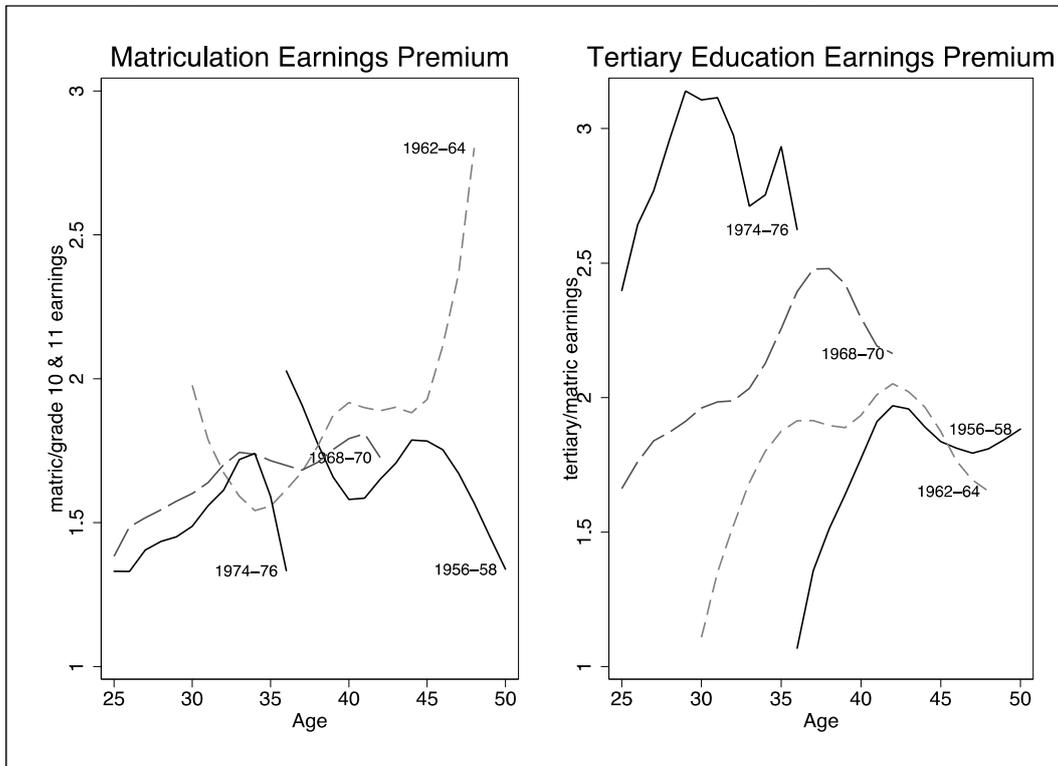
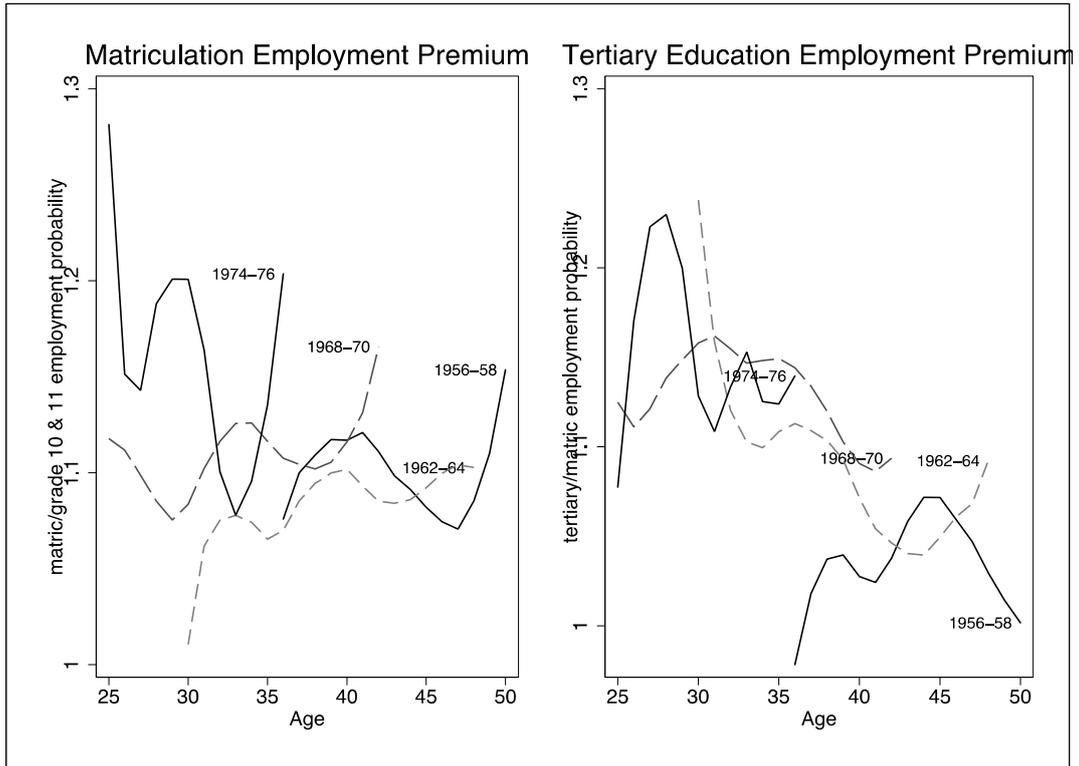


Figure 8: Matriculation and tertiary education earnings premiums



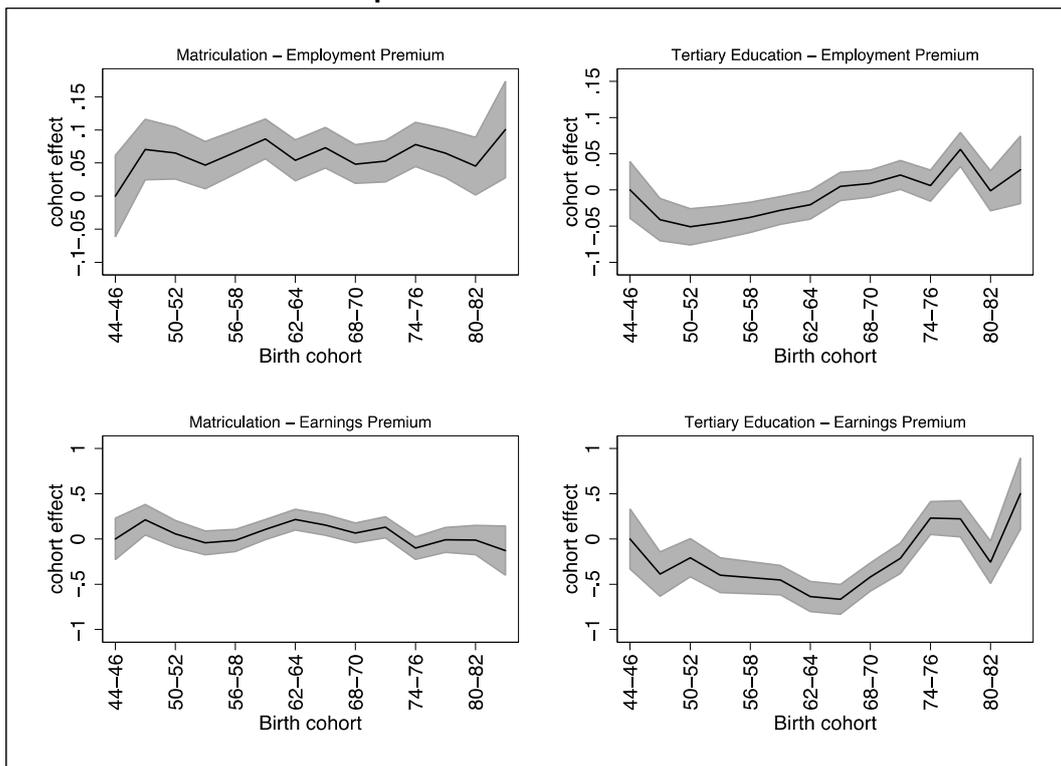
Notes to figure 8: Matriculation and tertiary education premiums calculated as the ratio of median matriculation earnings to median grade 10 and 11 earnings and ratio of median tertiary earnings to median matriculation earnings.

Figure 9 – Matriculation and tertiary education employment premiums



Notes to Figure 9: Matriculation and Tertiary education employment premiums calculated as the ratio of the employment probability among matriculants to the employment probability of grade 10 and 11s and ratio of tertiary education employment probability to matriculation employment probability.

Figure 10 – Matriculation and tertiary education employment and earnings premiums cohort effects



Appendix A

Table A1: Example of cohorts – Proportion of males with tertiary education

Age	1994-1996	1997-1999	2000-2002	2003-2005	2006-2008	2009-2010
26	10.0	8.8	9.2	8.0	9.4	10.3
29	11.3	8.8	10.7	9.9	10.5	11.3
32	10.6	10.7	12.6	11.6	11.6	11.3
35	11.6	10.8	12.1	13.5	12.6	13.9
38	11.1	10.7	11.9	12.1	15.3	15.7
41	9.5	9.2	11.7	11.9	13.8	15.5
44	9.9	9.4	11.5	11.3	13.4	15.4
47	10.6	9.3	10.3	11.7	14.6	13.2
50	8.8	9.4	10.4	11.4	10.8	14.6

Notes to Table A1: The proportion of respondent's with tertiary education by age group and survey year group. PALMS augmented with GHS 2008, 2009 and 2010 data used and weighted using the cross entropy weight supplied. Diagonal elements represent three-year birth cohorts, for example the highlighted elements represent males born in 1968-1970 between the ages of 26 and 50.

Table A2: Age-year cell sample sizes for tertiary educated respondents

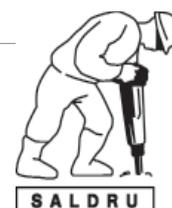
Age	1994-1996	1997-1999	2000-2002	2003-2005	2006-2008	2009-2010
26	600	480	1008	808	689	315
29	738	491	1205	1080	815	365
32	712	545	1172	1232	863	326
35	736	550	1050	1254	954	395
38	646	475	1165	1077	986	385
41	533	397	927	983	865	379
44	487	330	792	866	694	328
47	444	313	665	816	641	314
50	275	190	375	531	459	209

Notes to Table A2: Age-year cell sizes for the tertiary educated sample. PALMS augmented with GHS 2008, 2009 and 2010 data used and weighted using the cross entropy weight supplied. Diagonal elements represent three-year birth cohorts.

southern africa labour and development research unit

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

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



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